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Editorial Contents for September, 1929

Volume 103 *No. 9*

D. & R. G. W. Paint Storage Room ..... **Page 528**
A description of the new fireproof building and equipment used by the Denver & Rio Grande Western for paint storage at Denver, Colo.

Florida East Coast Engine Terminal at New Smyrna ..... **Page 531**
Seasonal demands for power influence the operation of this terminal to a large extent—Both running and class repairs are performed at New Smyrna.

Locomotives for Passenger and Fast Freight Service ..... **Page 535**
The Canadian National has recently placed 20 4-8-4 type locomotives in service having 73-in. drivers and a tractive force of 56,800 lbs.

Blacksmiths Hold Thirty-Third Annual Meeting at Detroit .. **Page 539**
A report of the convention of the International Railroad Master Blacksmiths' Association.

EDITORIALS:

Judicious Use of High-Speed Steel 525
Give the Workmen This Information 525
Piston-Rod and Crosshead Joints Eliminated 525
Car Men's Aids 526
Recommended Changes in Rule 4 526
A Matter of Definition 526
New Books 527

GENERAL ARTICLES:

D. & R. G. W. Paint Storage Room 528
Another Crosshead and Piston Separator.... 530
Gage for Checking Journal Lengths 530
Florida East Coast Engine Terminal at New Smyrna 531
Locomotives for Passenger and Fast Freight Service 535
Special Templates for the Drill Press 538
Blacksmiths Hold Thirty-Third Annual Meeting at Detroit 539
The Heat Treatment of Steel 540
Shop Tools and Formers 541
Selecting the Apprentice 544
Revolving Metal Small Tool Rack 545
Reading Builds Heavy 2-10-2 Type Locomotives 547
Decisions of Arbitration Cases 548
Handy Chuck for Machining Bolts 549
Santa Fe Gondola Has Cast Steel Underframe 551
Marking Off Lanes On Shop Floors 552
Canadian Pacific Portable Lumber Painting Machine 553
Integral Piston Rod and Crosshead 555
A Handy Filing Cabinet 556
Maintenance of Lifting Chains and Devices .. 557
Holding Device for Burnishing Tools 558

THE READER'S PAGE

Takes Issue with Editor 559
A Criticism From a Reader 559

NEW DEVICES:

Fastermatic Automatic Chucking Machine.... 560
Features Added to Landis Automatic Threader 561
Electric Grinder for Small Flat Work 562
Kaseberg Gages for Mounting Car Wheels .. 562
Improved Boiler Sludge Remover 563
Demagnetizing Switch Used on Magnetic Chuck 564
Tool for Oversizing Valve Stem Holes 564
Buffalo 16-in. Sensitive Drill 565
Wodack All-Purpose 5-8 in. Drill 565

NEWS OF THE MONTH 566

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Railway Mechanical Engineer

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Vol. 103 September, 1929 No. 9

Judicious Use of High-Speed Steel

THE economies that can be obtained through the use of high-speed tool steel have been so well instilled in the minds of those responsible for its purchase and usage that it is generally assumed that it can be used for all kinds of cutting tools irrespective of the kind of metals to be cut. The chief value of high-speed steel is that it will continue to cut metals effectively even after the tool has become heated to a temperature that would destroy a carbon steel tool, but there are many conditions where this property of the steel is not required and where cheaper steels will, therefore, serve the purpose better. A study of the various kinds of metals cut in the shop will show where cheaper grades of tool steel can be used just as well as the expensive high-speed tool steels. In this way the foreman can aid materially in reducing the purchases of expensive tool-steel. The more expensive material is not necessarily the best for every purpose and judgment must be used in determining in each case which kind of steel to select.

Give the Workmen This Information

THE railroads, as a general rule, purchase quality machine tools, the unit values of some of which may be as high as $50,000. About $3,000 is a fair average price of the machine tools in railway shops. Few of the operators realize the amount invested in some of the machines they operate. If they did, many of them would take a greater personal pride in their machines. They would see that they were properly lubricated, would immediately report any indication of trouble, and would not be so prone to crowd them beyond their capacities as is commonly done by many operators. Would it not be a good idea to let each workman know the cost of the machine that he operates, as has been done in one industrial plant? This information can be given to the men in various ways: by the aid of a bulletin board, through the employees' magazine, or through information given out by the foremen. For instance, the foremen could explain to the operator of each expensive machine that a certain amount of work must be produced by the machine in order to justify its purchase. Each operator would then realize that if a machine is shut down for repairs, because of negligence or abuse on his part he is responsible for a considerable loss to the company. The average workman will take pride in the fact that he operates an expensive machine and will feel the responsibility of being entrusted with its care. With this attitude of mind the machines will be less liable to abuse which will react favorably on production and maintenance costs.

Piston-Rod and Crosshead Joint Eliminated

ON many roads more or less trouble is experienced in maintaining the common taper fit and key connection between piston rods and crossheads, particularly on large modern power. With cylinders upwards of 31 in. in diameter and steam pressures of 250 lb. per sq. in., the piston thrust which must be transmitted through this connection is enormous, and the surprising fact is that the piston-rod-crosshead fits do not start working more frequently than they do, with resultant inevitable failure of the rod, the key or the crosshead.

The *Railway Mechanical Engineer* has in the past published articles which suggested ways and means of strengthening this weak element in locomotive design, but the idea of eliminating it entirely has been first worked out to a seemingly practicable solution by E. C. Anderson, mechanical engineer of the Chicago, Burlington & Quincy, as described in an article elsewhere in this issue. The method consists especially of making the piston rod and crosshead an integral forging with provision for applying and removing the crosshead through the back cylinder head by means of an auxiliary cover. Six of the new 2-10-4 locomotives built for the Burlington by the Baldwin Locomotive Works have been equipped with this new type of crosshead. Their performance in service to date has been entirely satisfactory and their future performance will be watched with much interest.

Difficulties with the piston-rod-crosshead fit begin to stand out when cylinders reach diameters larger than 22 in. On some roads it is specified that the piston rods and crossheads be separated for inspection purposes as often

as once in three months, or even once a month. This additional maintenance expense, which the railroads feel is justified because of the possibility afforded for locating a defect before it has progressed sufficiently to cause total failure and a locomotive accident, will be saved in the event that Mr. Anderson's design proves successful and is generally adopted. In some other respects, the integral piston-rod-crosshead design will cause increased expense. If failures can be eliminated, however, that factor will no doubt overbalance the influence of all others combined.

Car Men's Aids

IN presenting a paper entitled "A. R. A. Billing" at the April meeting of the Car Foremen's Association of St. Louis, B. F. Jamison, special traveling auditor of the Southern, called attention to the increased knowledge which car men generally possess regarding the details of this important subject, but made a strong plea for a still better working knowledge of the A. R. A. interchange rules. He said: "We must know the book well enough to use it quickly and correctly, turning at once to desired rules and knowing that while a given rule appears to apply, yet the case in question is also covered by another rule which may, when both rules are considered, bring a much different conclusion. Many busy persons appear to be under the impression that they will never be able to acquire any degree of efficiency in the application of the billing rules, because they cannot commit to memory every rule in the book. You must remember that a lawyer would find it impossible to commit to memory all the laws, or court decisions, and this reminds me of the ruling of our court of last resort, known as the Arbitration Committee. The rulings of this committee are furnished us that we may be familiar with the interpretations which have been placed on the rules governing many cases where disputes have been held. The cases are not only very interesting, but helpful, where one will become sufficiently familiar with them to make use of the rulings in difficult cases." Mr. Jamison mentioned a number of aids to the study of the rules, including the A. R. A. Manual of Standard and Recommended Practices, the Wheel and Axle Manual, the Arbitration Committee Rulings, the Car Builders' Cyclopedia and the *Railway Mechanical Engineer*. It is needless to say that we are glad to see our name mentioned in such august company and by a man of Mr. Jamison's wide experience and intimate knowledge of A. R. A. billing conditions.

Recommended Changes in Rule 4

THE fundamental requirement of A. R. A. Interchange Rule 4 is that defect cards shall be attached to cars by the railroad responsible for the damage and if that rule is lived up to, many difficulties now experienced in interchange will be greatly reduced. It has always been a difficult matter to decide whether or not defect cards should be issued for certain delivering-line defects referred to in Rule 4. The Arbitration Committee, in its earnest efforts to improve the rule, has revised it a number of times without effecting the desired results, but close study of the changes recommended this year will, it is believed, indicate to all concerned that the committee has finally struck the keynote of the problem and that the more definite yardstick now devised will undoubtedly go far towards bringing about greater uniformity in defect carding.

It cannot be denied that a certain amount of "passing the buck", in the enforcement of Rule 4, is now taking place. The failure of one road to inspect a car damaged on its line and to attach a defect card frequently results in another road being held responsible for the damage, and it is not good sportmanship nor in the interest of efficient railroading thus to penalize the last delivering line, which usually foots the bill. The indications are that proper enforcement of the provisions for adequate inspection and defect carding, as incorporated in the recent revisions of Rule 4, will be productive of economy to the railroad and place the responsibility for car damage where it belongs.

A Matter of Definition

A CORRESPONDENT on the Reader's Page this month takes issue with certain statements in the editorial entitled, "Where Does the College Man Come In?" which was printed in the August number. In the main the issue largely hinges on the definition of the word "engineer." It is evident that the writer of the letter includes more in his definition than was contemplated in the editorial.

The question of the relation of the college man with the railroad is by no means confined to graduates of engineering courses nor to the roadway and equipment departments. The comments in the August issue, however, were meant to be confined to mechanical engineering graduates on the one hand and to the motive power and car departments on the other.

There are numerous activities which may be described as engineering activities for which the mechanical engineering graduate may be no better fitted than are many men without this kind of training. The writer mentions particularly the utilization of material-handling apparatus in the repair shops, on the repair tracks, in enginehouses, in track work and in freight-house and passenger-station operations. The possibilities for the utilization of such equipment, the selection of the type of equipment most suitable for each specific purpose and the structural problems of installing the equipment are, it is true, just as much engineering problems on the railroads as in other industries. The control of the operation of these facilities in any of the departments mentioned, however, is not essentially a mechanical engineering problem and the fact that such equipment has already effected great savings on the railroad and that opportunities still exist for a much wider utilization of it hardly demonstrates the need for specialized engineering training on the part of the supervisors and officers who use it.

Recognizing the Trained Engineer

Our correspondent also asks, "Are the railroads not losing out by failing fully to recognize the part that the trained engineer could play in helping to bring about more efficient and more economical operation?" The period since 1920 is one during which tremendous improvements in economy and efficiency of operation have been effected. During these years we have seen great improvements in the utilization of both cars and locomotives. The long engine run has reduced the number of engine terminals; more systematic classification in the mark-up of freight trains at initial terminals has improved the dispatch with which freight is moved to its

destination and has decreased the amount of yard switching enroute. In a broad sense the planning of such improvements may be classed as a form of engineering, but the ability to plan is by no means confined to graduates in mechanical engineering. The inception of such improvements is the fruit of intimate experience with the details of operation and no form of training which is purchased at the expense of such intimate practical experience is likely to further the development of such improvements. This may also be said of the improvements in shop and engine-terminal operation which have been strictly within the jurisdiction of the motive power and car departments.

The Work of the Inventor

Our correspondent also asks, "Is it not true that a very large percentage of the improvements which have been made in the mechanical, civil engineering, electrical, signaling and operating departments of railroads have been suggested and possibly largely developed by railroad men in railroad service, the manufacturing interests taking over and perfecting these improvements and putting them on a production basis in order that they may be more widely distributed?" Here we are dealing with what is essentially the work of inventive genius, something which is hardly created by training. It has been the work of the engineer to develop the ideas of the inventor—to make them workable and commercially practicable. The financing of his work in this respect has been and probably will continue to be the function of the railway supply manufacturer. The development of inventions must be considered by the railway as incidental to its main job of making the best use of the kind of facilities which are already obtainable in usable form.

We do not wish to convey the impression that we believe there is no need for mechanical engineering talent in the motive power and car departments of the railroads. We merely wish to point out the distinction between the function of the line supervisor and officer and of the staff specialist as it affects the need for a conventional engineering training. The railroads have long employed the latter but undoubtedly still fall far behind a full realization of his possibilities.

We do not wish to side-step the issue, as suggested by our correspondent, and we do not presume to have settled it. We shall be glad to have our readers suggest ways in which the engineer can be used more effectively on the railroads.

New Books

PROCEEDINGS OF TOOL FOREMEN'S ASSOCIATION. *Edited and compiled by G. G. Macina, secretary-treasurer, 11402 Caiumet avenue, Chicago, 152 pages, 5 in. by 8½ in., illustrated, bound in imitation leather, price $2.50.*

As has been the case for the past five years, the proceedings of the annual convention of the American Railway Tool Foremen's Association, held at Chicago, September 12, 13 and 14, 1928, have been carefully arranged, edited and published in book form. The binding, with covers of imitation leather, is such that the book will form an attractive addition to any library. Conveniently arranged indexes permit the ready location of any of the reports or addresses as well as the remarks of any person who took part in the discussion.

The proceedings include the following addresses: Car Shop Tools, by P. Kass, superintendent of the car department of the Chicago, Rock Island & Pacific; The Relationship of the American Society of Mechanical Engineers and the American Railway Tool Foremens Association with the American Engineering Standard Committee, by E. H. Ehrman, chief engineer of the Standard Screw Company; and relation of the Purchasing Department to the Tool Room, by D. C. Curtis, chief purchasing officer of the Chicago, Milwaukee, St. Paul & Pacific. In addition, committee reports were included on the following subjects: Proper Heat-Treatment of Steel; Standardization of Boiler Tubes; Jigs and Devices for Locomotive and Car Shops; and Rake and clearance of Machine-Cutting Tools.

PRACTICAL RAILWAY PAINTING AND LACQUERING. *By H. Hengeveld, master painter, Atlantic Coast Line; C. P. Disney, bridge engineer, Canadian National, and William J. Miskella, M. E., director, Finishing Research Laboratories, Inc. 242 pages, illustrated. 6 in. by 9 in. Bound in gray Fabricoid. Published by the Finishing Research Laboratories, Inc., Chicago, and distributed by the Simmons-Boardman Publishing Company, 30 Church street, New York. Price $3.50.*

This book, which has been prepared as a handbook for railroad men, is the fourth volume of the practical finishing series being prepared by the Finishing Research Laboratories, Inc., a review of this book would not be complete without telling something about the co-authors. H. Hengeveld is master painter, Atlantic Coast Line, Waycross, Ga., and has served as supervisor in railroad equipment painting work for over 39 years. He is a past president of the Equipment Painting Section of the Mechanical Division, American Railway Association. C. P. Disney, bridge engineer, Canadian National, is well known among railway maintenance department engineers. William J. Miskella is director of the Finishing Research Laboratories, Inc., and is the sole author of the first three volumes of the practical finishing series.

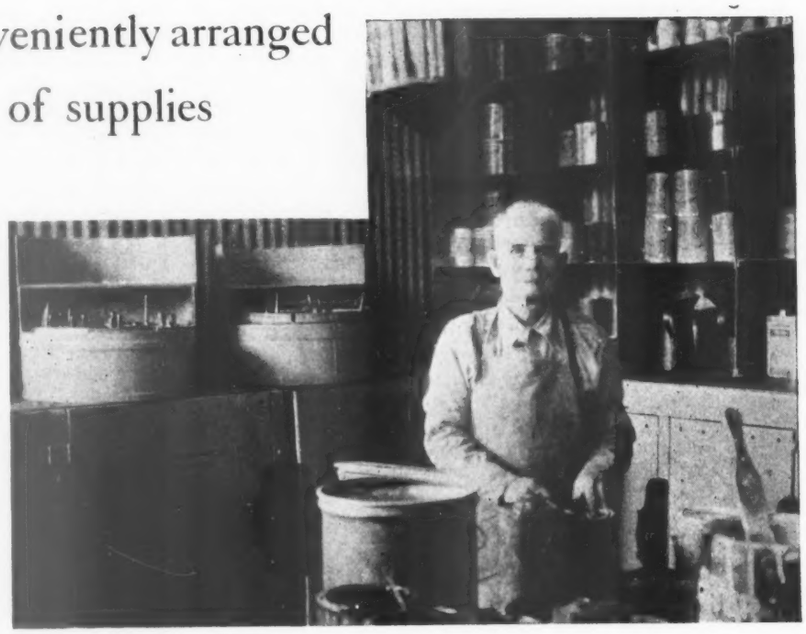
The book is divided into five parts; namely, General Information; The Painting and Lacquering of Locomotives, Freight and Passenger Cars; The Painting of Signal Equipment, The Painting of Bridges, Buildings and Water Service, and the Lacquering of Electric Railway Cars. Six of the thirteen chapters included in Part I are devoted to such items as spraying equipment accessory equipment, portable cleaning equipment and scaffolding. The other chapters included in this section are on such subjects as lacquers, other paint materials housekeeping and hazards, and ornamentation. Part II consists of six chapters devoted to the discussion of such subjects as shop cleaning methods and equipment, freight car painting, passenger car lacquering, locomotive finishing, buses, and cleaning railway equipment. One chapter is included in Part III on the painting of signal equipment. Six chapters are incorporated in Part IV which cover the following subjects: Steel bridges, concealed corrosion, the Quebec bridge, other structures, building painting, and water service. Part V contains a single chapter which is devoted to the subject of the lacquering of electric railway cars.

The book is well illustrated and contains a wealth of information on equipment painting, which is not only of value to master painters, but to purchasing agents and other mechanical-department supervisory officers as well.

D. & R. G. W. Paint-Storage Room

It is fireproof and conveniently arranged for the storage of supplies

By Jos. C. Coyle



A corner of the fireproof paint storage room

SEVERAL months ago a fire burned out the old paint-storage room at the car shops of the Denver & Rio Grande Western at Denver, Col., which led to the construction of a new fireproof building in which the equipment, especially the storage room for the coach shop, is of particular interest. As the walls, roof and floor are of metal, so are the shelves, lockers and boxes for material, clothing, etc.

Around three sides of the space near the door used as a lobby for men coming in for material, except where the 3-ft. gate enters the stock room, is a counter made of ¼-in. plate, 27 in. wide. This is constructed on a frame of 2-in. pipe, joined together with tees and elbows, and has a shelf of the same material and width beneath the counter. Above the counter is a grating of coarse wire, framed with 1-in. angles and straps, well riveted. This contains a window, 24 in. square, for passing out material. The counter at each end is used more or less for storage. On one end of the counter is a metal cabinet with a number of pigeon holes for sandpaper and other accessories. Against the wall at this corner of the room is a metal bench, 16 in. wide and 5 ft. long, on which sets an upright locker made of riveted steel plate, with sheet-metal partitions forming eight pigeon holes 14 in. by 16 in., and one partition 20 in. by 14 in. by 16 in. This cabinet is made of ⅛-in. plate and is used for the storage of extra brushes, colors, etc.

Steam heated rack for drying car windows

Construction of the Shelves and Benches

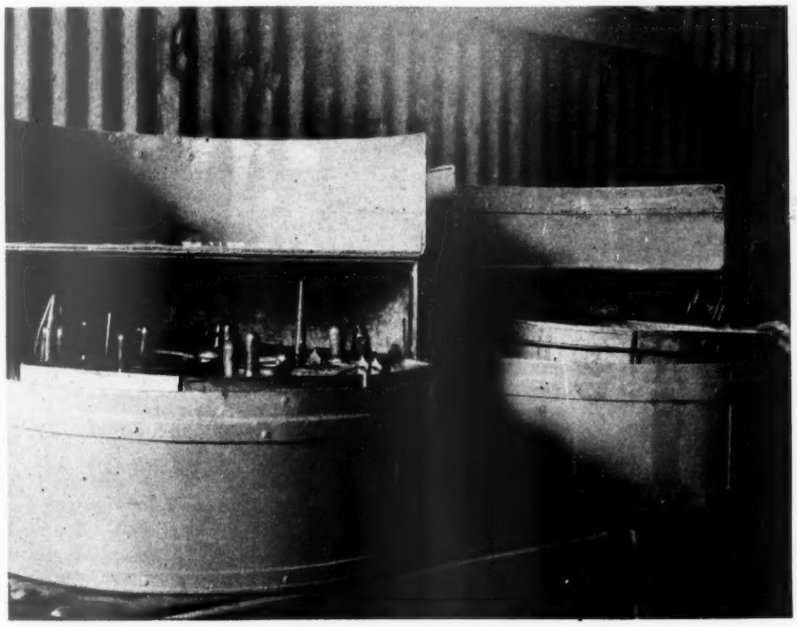
Along the west and north walls of the room is a shelf made of ¼-in. plate, 30 in. wide. Nine feet of this shelving is located along the west wall and 15 ft. along the north wall. Beneath these benches are two shelves of ⅛-in. plate, all riveted on a frame of 1-in. by 3-in. steel bars, forged to the proper shape for carrying the shelves. These shelves are enclosed by doors made of ⅛-in. plate. The three doors which enclose the shelves along the west wall are 38 in. high (the height of the shelves described) by 25 in. wide. The six doors which enclose the shelves along the north wall are 34 in. by 25 in. The names of the materials stored on the shelves are stencilled on the front of each door.

Over the shelves on the north side of the room are located 30 pigeon holes, constructed of 1/16-in. plate, 24 of which are 22 in. by 22 in. by 14 in. The remaining six holes are 22 in. by 10 in. by 14 in. These pigeon holes are constructed by the welding process.

The top row is used for sandpaper

and the remainder for various kinds of paints, etc.

A two-compartment clothes locker, 24 in. by 16 in. and 4 ft. high, is located near the northeast corner of the room. It is also made of ⅛-in. plate, welded, and has 1-in. angles attached to the sides and central partition for the insertion of shelves when desired. A box made of 1/16-in. metal used for rags and waste is located along the east wall. It is 43 in. by 24 in. and has three compartments—one for colored waste, one for white waste, and another for rags. The top half of the box is made into a hinged, sloping cover. This box eliminates the constant danger of fire which is present with greasy waste or rags lying about the stock room.



All-metal sectional brush-cleaning vats

The 3-ft. by 4-ft. work table located in the center of the room is also made of ⅛-in. plate supported with legs made of 3-in. angles braced with 1½-in. straps, all riveted. The steam pipes used for heating the room are covered with a shield made of ⅛-in. plate. All shelves, counters, etc., are painted and the floors are kept spotlessly clean.

The Brush Cleaning Vats

Two sets of brush cleaning vats have been made which have proved of great convenience in keeping paint and varnish brushes in good condition. Each set consists of eight sheet-metal tanks of sector form 10 in. deep and 11 in. long. Each tank is reinforced at the broad end by a coarse wire soldered along the top edge. The eight tanks together form a circular group, 23 in. in diameter, and are held together by a small vertical rod, with a nut and large washer near the bottom end and a bell and thumb screw at the top. A circular sheet of 1/16-in. plate, resting on three legs 2 in. high and with a center plate, sets on the counter or shelf beneath the trays and supports the rod which holds them together. A 1-in. metal hoop, soldered around the outer edge of this sheet, holds the tanks in place.

By this arrangement the entire group of tanks is easily turned around so that a tank on the back side may be removed for cleaning, or the brushes in it may be taken out. Each tank is stencilled on the outer end with the name of the paint or other material in which the brushes have been used, such as "Paint," "Varnish," "Duco," etc. This is necessary because each material requires a different solvent for cleaning the brushes, which are suspended in the tanks by slipping a small piece of wire through a hole in the handle. A sheet-metal cover 24 in. in diameter is used over each group, and, in order that this need not be removed entirely to reach the contents, about one-fourth of it, or half the upper part, consists of a hinged lid, which is shown turned back in the illustration.

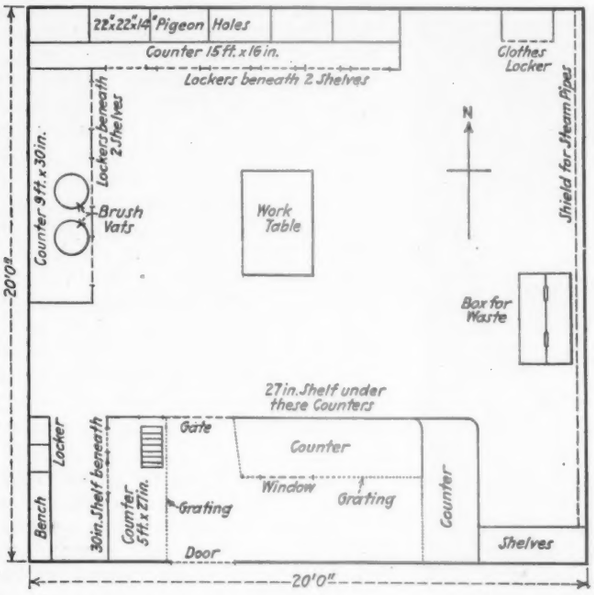
This gives easy access to the tanks. If one of the tanks at the back is to be cleaned, the set is given a whirl, bringing it to the front where it is removed, the tension thumb screw tightened down again, and the rest of the set is again secured to the base.

In the coach paint shop the arrangement of the drying racks for doors and windows is particularly interesting. The rack for the doors occupies a space 25 ft. long, 8 ft. high and 3 ft. deep along one side of the paint shop. Steam pipes are placed behind a 4-ft. partition, a few inches from the back of the space. On the front of this partition near the top is a 1-in. by 6 in. timber, into which tapered wooden pegs are set every 3 in. throughout the length of the rack. The freshly painted doors are stood endwise between these pegs, which barely touch them in a small spot. Inverted Vee-shaped

Thirty-five doors may be dried in this rack at one time

strips of wood hold the bottoms of the doors apart. The rack will hold 35 doors.

The window rack is of the same length and height and is 30 in. deep, with steam pipes in the back at the floor. Four vertical 2-in. by 4-in. timbers every 3 ft.

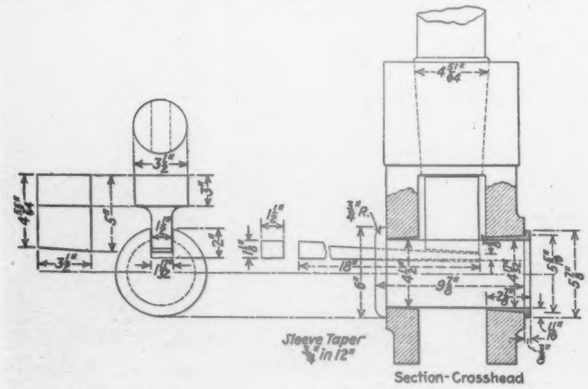


Floor plan of the D. & R. G. paint-storage room at Denver, Col.

hold a row each of metal spikes, which are 6 in. long and set with a decided downward slope. This prevents any possible warping of the painted windows, while a minimum contact with the painted surface is secured at the extreme edges of the frames. The rack will hold 80 windows.

Another Crosshead and Piston Separator

WITH the usual type of crosshead-and-piston separator the pin is inserted in the crosshead from the rear, which is often difficult to do if the engine is not standing properly. Another disadvantage is that, when driving home the pulling wedge, the pin has a tendency to back out when the wedge begins to tighten on the plunger lever. The piston puller illustrated is designed so that the pin is inserted from the front of the crosshead. The plunger lever is inserted first, after which the pin is placed in the crosshead. A tapered sleeve which fits around the rear end of the pin is slipped in from the back side of the crosshead. The driving wedge is then inserted and driven home. The pin is prevented from slipping by the tapered sleeve and the collar around the front end of the pin. The method of application and the details of the puller are shown in the illustration.



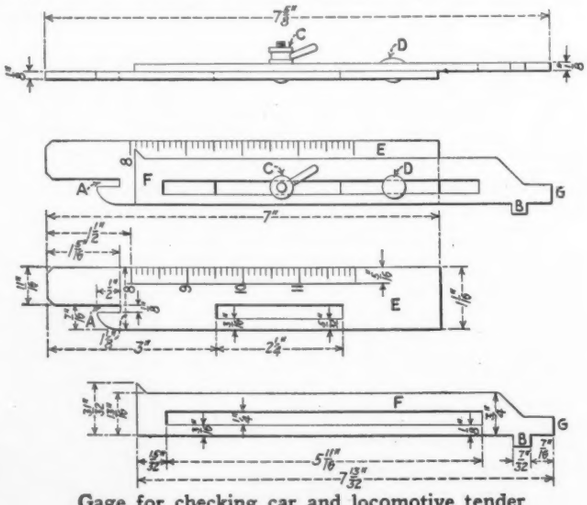
Crosshead-and-piston separator designed so that the pin can be inserted from the front

Gage for Checking Journal Lengths

By Earl Chamberlain
Car Foreman, Southern Pacific, Tucson, Ariz.

THE illustration shows a gage for checking the lengths of journals on cars and locomotive tenders which meets all of the requirements of Paragraph 208 of the A. R. A. Wheel and Axle Manual recommended practice adopted in 1928.

The gage is made of ⅛-in. hardened steel. Slot *A* is ⅛ in. wide, which dimension gives ⅛ in. below the



Gage for checking car and locomotive tender journal lengths

dust guard on the back fillet. The lug on the gage at *B* is ¼ in. high. This dimension is given ¼ in. above the journal surface on the inside face of the collar. The gage is graduated in 1/16 in. up to 11 in. It can be made longer if desired. Rivet *D* is stationary in section *E* of the gage. Section *F* has a slot cut lengthwise and slides backwards and forwards on section *E*. The position on the scale of the pointer on section *F* corresponds with the length of the journal being gaged when the end *G* is out against the journal collar. This movement is controlled by thumb-screw *C*. Section *E* is tapered from 19/16 in. at one end to 17/16 in. at the other end, and section *F* is tapered from 31/32 in. at one end to ¾ in. at other end. The purpose of the taper is to drop from ⅛ in. on the back fillet to ¼ in. above the face of the journal on the back of the collar.

The Florida East Coast engine terminal at New Smyrna, Fla.

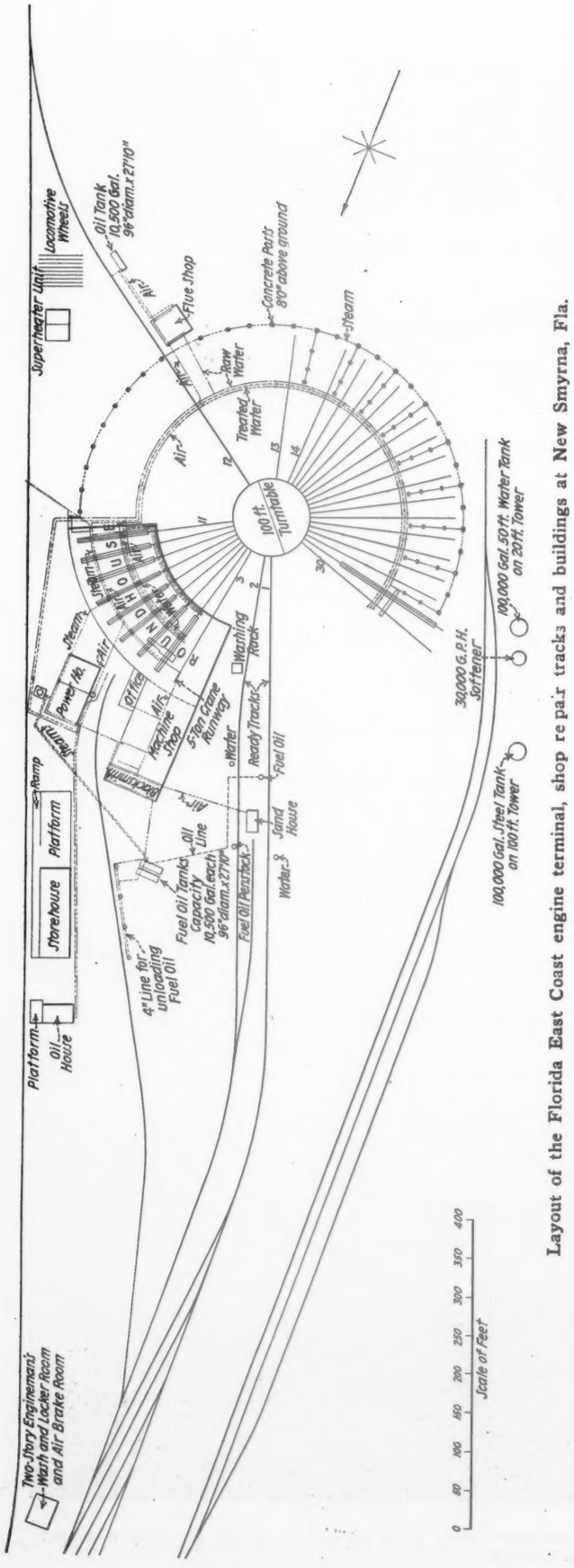
Florida East Coast Engine Terminal at New Smyrna

Performs running and class repairs—Seasonal demands for power influences operation

DURING the year 1925 the Florida East Coast completed the erection of and the installation of equipment in its new engine terminal at New Smyrna, Fla., which consists of a nine-stall enginehouse, machine shop, power house, and modern facilities for servicing locomotives, such as inspection, sanding and fueling. A modern plant for treating water was also included in the facilities built at that point.

New Smyrna is located on the east coast of Florida, 125 miles south of Jacksonville and 400 miles north of Key West, at the junction points of branch lines to Orange City Junction, Benson Junction and Okeechobee. This location is strategically favorable in the operation of the system for the handling of locomotives both for passenger service, and the perishable fruit and vegetable business. Other enginehouses are located at Miami (Hialeah), Fort Pierce, Bowden and Key West. The main locomotive repair shops are at St. Augustine. However, owing to the seasonal character of both the passenger and freight business of the Florida East

Locomotive washing equipment—The yard crane used in locomotive repair work performed outside the shop is shown in the background



Layout of the Florida East Coast engine terminal, shop repair tracks and buildings at New Smyrna, Fla.

Coast, considerable heavy repairs are made at New Smyrna.

Class repairs are performed in the various enginehouses on the line, principally at New Smyrna and Hialeah, during the off-season. All locomotives on the line are placed in first-class condition during this period. As a result of this policy, only running repairs and turn-around service are required of the different engine terminals during the busy season. Of course, some heavy and class repairs are necessary during the entire year, but this work is kept at a minimum during the time that the locomotives are badly needed.

In this connection it should be mentioned that the Florida East Coast is one of the few railroads in the country that is blessed with a surplus of modern power. This fact permits the management to utilize its locomotives to the fullest extent possible and at the same time to withhold the making of heavy and class repairs until business becomes slack during the summer months. Sufficient power is available at all times so that the enginehouse forces are able to perform all of the work reported by the inspector. At practically all times there is another locomotive ready to take the place of any held out of service.

Climatic Conditions Factors in Construction of Repair Facilities

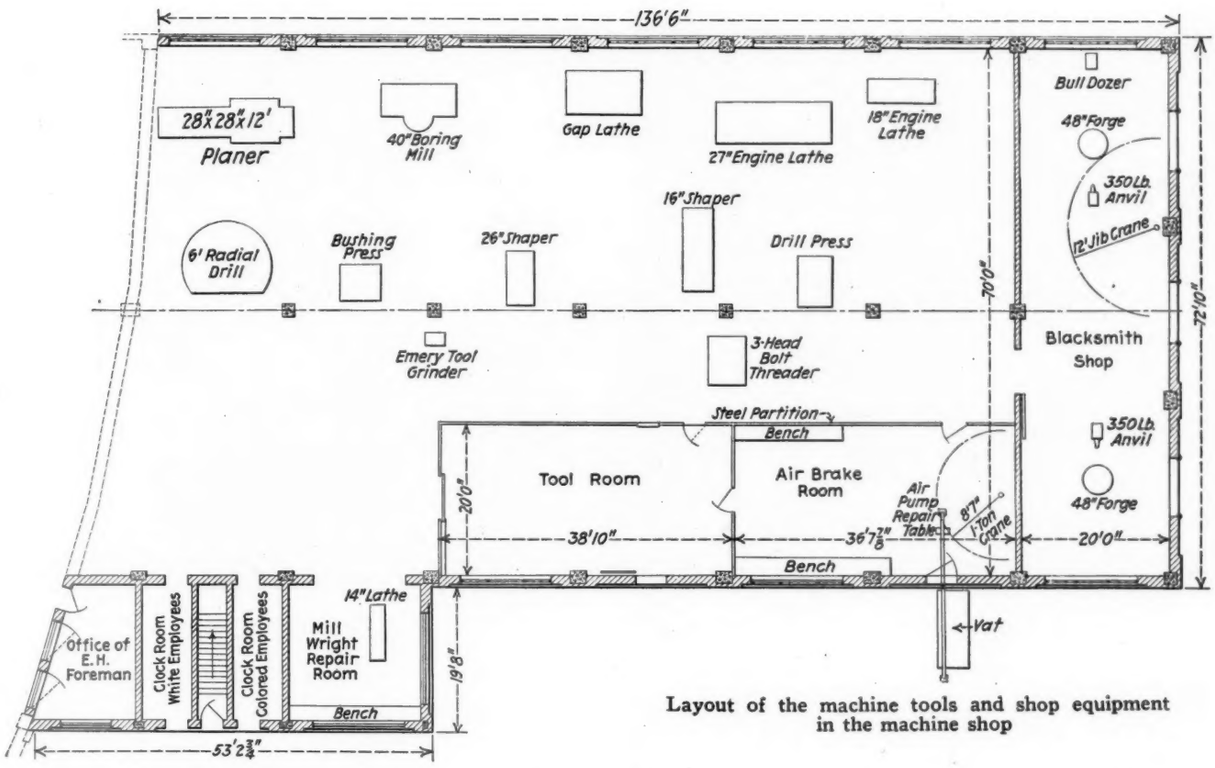
The fact that the enginehouse itself contains only nine stalls, eight of which are pit tracks, does not necessarily mean that the work is limited to that particular area. On the layout drawing of the shop buildings and tracks it will be noted that there are 18 additional working tracks located on the opposite side of the 100-ft. turntable. One of these tracks is a pit track which is equipped with a drop pit for making repairs to engine, trailer and tender trucks.

Climatic conditions in Florida make it possible to perform a large part of the locomotive repair work in the open during the greater part of the year. During practically 10 months of the year, it is only necessary to provide tracks and a substantial floor on which to operate trucks and to place tools and benches. Thus the engine terminal at New Smyrna should be considered as a 27-stall installation.

About 20 locomotives are turned each day at New Smyrna in addition to running and class repairs, including Class 3 repairs, which are performed during the off-season periods. This work is handled with an average force of 102 employees, including machinists, hostlers, laborers, etc., and supervisory staff.

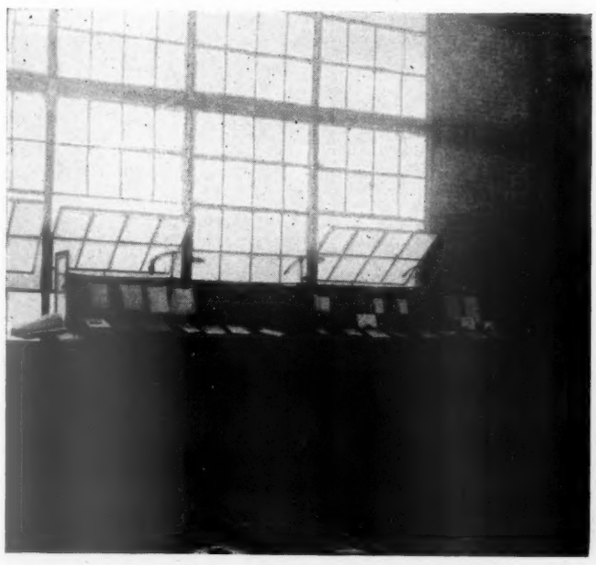
Both incoming and outgoing locomotives use the "ready tracks," Nos. 1 and 2. Both flue and rail sand, water and fuel oil can be supplied to the locomotives on either track. The outside hostlers spot their locomotives near the two story building which serves as the enginemen's wash and locker room. The engineman inspects the locomotive and makes out his work report which is placed in a special receptacle in the locomotive. With the work report, the engineman also files a report of delays caused by any mechanical defects on the locomotive. If there were no delays, he so states on his report. Two copies of the delay report are made, one of which goes to the road foreman of engines and the other to the master mechanic. This report calls for such information as the duration of the delay and whether the defect occurred when running, starting, stopping or switching. It also asks the engineman to state what action he took to repair the defect and what, in his opinion, was the cause.

The inside hostler takes the locomotive at the "ready



Layout of the machine tools and shop equipment in the machine shop

tracks" to the enginehouse where it receives sand, fuel and water. It is then taken to track 9, 10 or 11 in the enginehouse. Each locomotive is cleaned en route from the sand house to the turntable, with a D. & M. cleaner. The location of the washing rack is shown on the layout drawing of the repair tracks and buildings at New Smyrna on page 532.

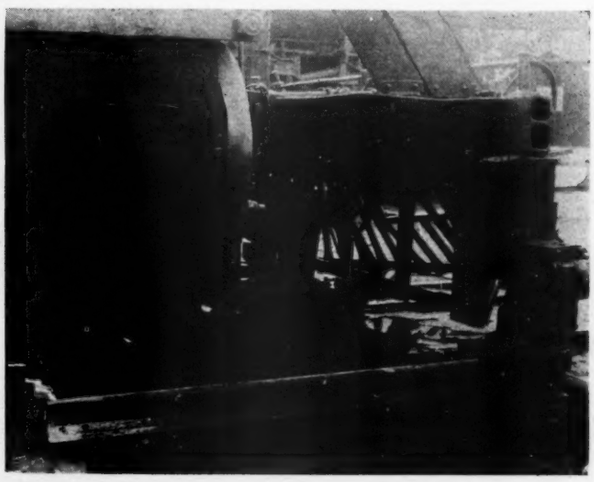


Inspector's desk located near tracks 9, 10 and 11

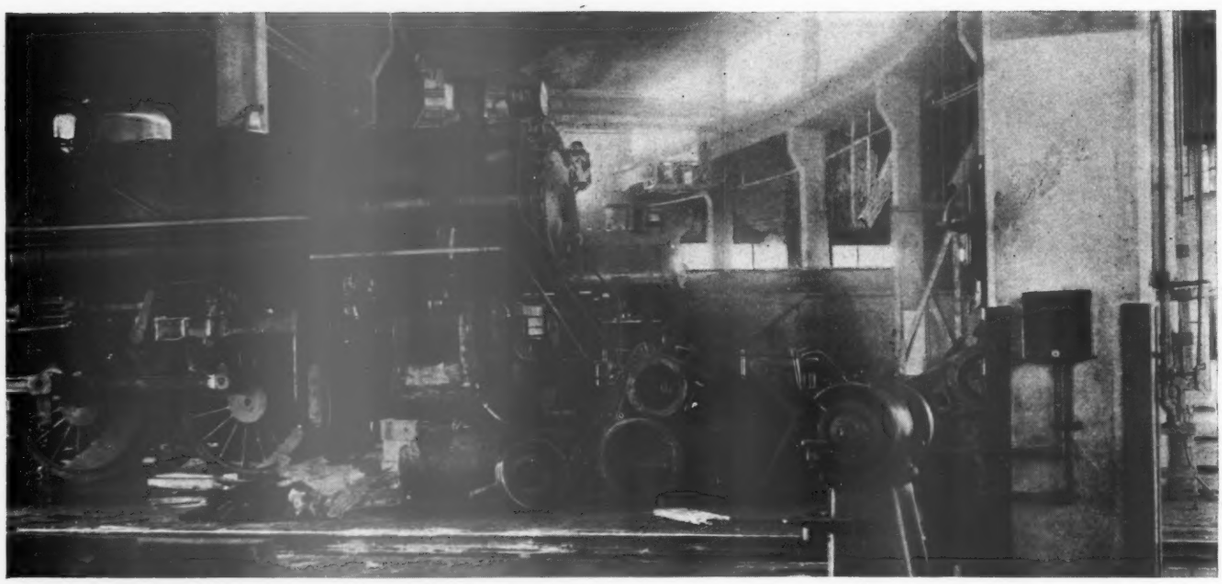
The inspection work is performed in the enginehouse on tracks 9, 10 and 11. Here the locomotive is given a thorough inspection and all work required underneath the locomotive, such as brake rigging repairs, setting-up wedges, etc., is performed. Attention is also given at this point to the lubrication of boxes and journal bearings. The locomotive is then moved to one of the storage tracks outside the enginehouse.

The New Smyrna Engine Terminal Is Well Equipped

One drop pit for dropping driving wheels extends under tracks 4 and 5 in the enginehouse. The pit-track area of the enginehouse is served with a 10-ton circular traveling crane which is used for handling air compressors, feedwater heaters, etc. Another drop pit is located outside under tracks 29 and 30. This pit is used for engine, trailing and tender trucks. A long section of depressed track, shown in one of the illustrations, of sufficient length to swing four pairs of wheels for changing driving wheel tires, is included in track 6. A Brown-Hoist yard crane is used outside the shop to remove rods, driving wheel tires and other heavy parts. Wheel



Dropping a pair of engine truck wheels on track No. 29



Interior view of the enginehouse—The locomotive in the foreground shows a cracked cylinder about to be welded

centers are left on the engine and tires are removed when the yard crane is available. Four pairs of tires are removed, turned and reapplied, ready for service in eight hours.

The layout of machine tools and equipment in the machine shop is shown in one of the drawings. The air-brake repair room, blacksmith shop, millwright's repair shop and toolroom are arranged around the main floor which is served with a five-ton overhead electric traveling crane.

The shop buildings are of concrete and brick construction. All the shop repair buildings and tracks are provided with steam, water and air lines. The steam pipe lines are laid 8 ft. above the ground on posts of concrete construction. Adequate sanitary facilities and locker rooms are provided for both white and colored employees. The washrooms are equipped with 54-in. Bradley wash fountains. Offices for the master mechanic, enginehouse foreman and clerical forces are located in a two-story addition, situated in the angle formed by the machine shop and enginehouse. The sand house is equipped with a tower, elevator and chutes for handling both rail and flue sand direct to the locomotive. The entire equipment for drying and handling the sand by mechanical means was designed and built by the railroad.

The machine shop

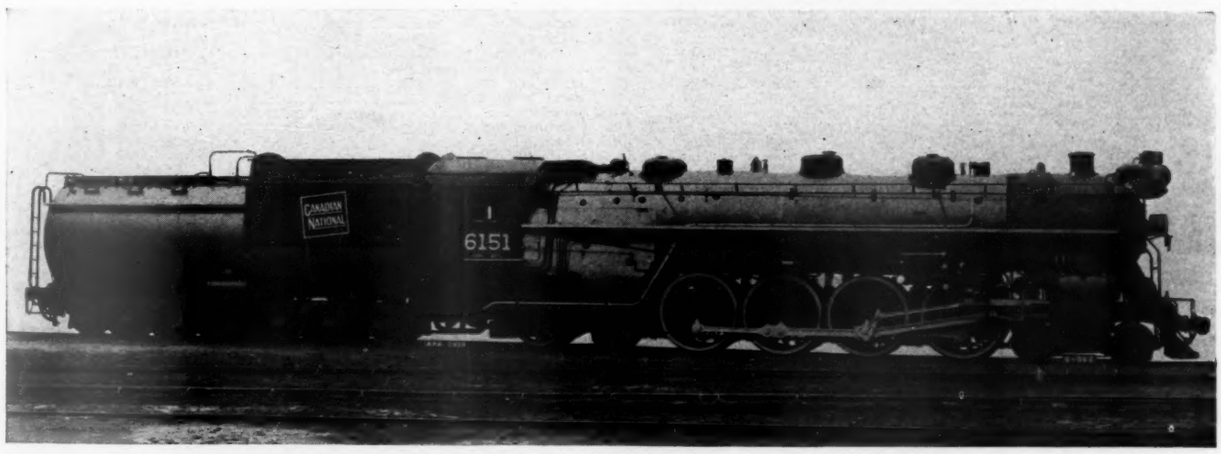
Locomotives for Passenger and Fast Freight Service

Canadian National buys 20 locomotives equipped with tenders of novel construction—Alloy steels extensively used

THE Canadian National recently placed in service 20 4-8-4 type locomotives in the design of which a number of new and novel features have been incorporated. These locomotives, which were built by the Montreal Locomotive Works, Ltd., are designed for either passenger or fast freight service. They are known on the Canadian National as the Northern type, and are to be used on long runs which extend over two or more divisions. The maximum rated tractive force of one of these locomotives is 56,800 lbs. They have 73-in. drivers, 25½-in. by 30-in. cylinders, and the boilers carry a pressure of 250 lb. The total weight of the engine is 383,000 lb., of which 232,200 lb. is carried on the drivers.

Steel Underframe Construction Abandoned in Design of the Tender

The tenders of these locomotives are of the Vanderbilt type, having a capacity of 11,000 Imperial gallons (13,800 U. S. gal.) of water and 20 tons of coal, and



Canadian National 4-8-4 type locomotive built by the Montreal Locomotive Works, Ltd.

are of special interest in that they embody some features which, it is believed, are employed for the first time in locomotive practice.

The customary steel underframe has been abandoned and the bottom of the tank is formed from a plate of sufficient thickness, when reinforced by an internal I-beam running longitudinally, not only to take care of the stresses imposed on the structure due to dead weight and coal and water load, but also to transmit all pulling and buffing stresses from the rear coupler to the engine. The front and back draw castings are of steel, designed in suitable saddle form to fit the curved bottom, having bosses and fitting strips machined to the required radius. The front casting has the usual pockets to receive the drawbar, safety bar and radial buffer. The rear casting forms a housing for the draft rigging and has a bumper beam cast as an integral part of it.

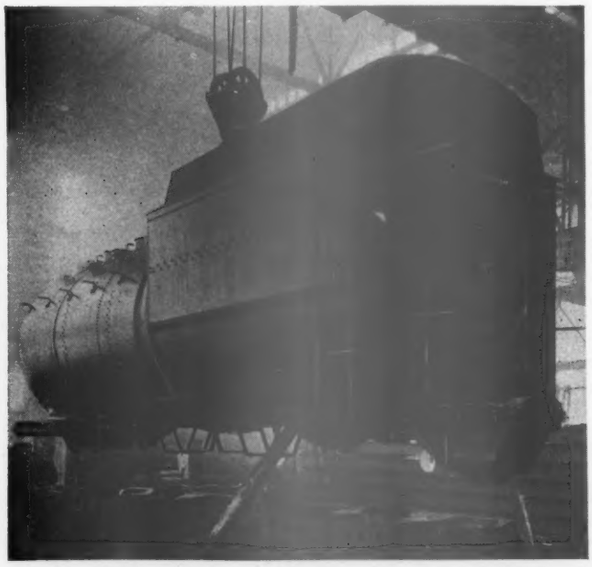
These castings are each securely riveted to the bottom plate by 50 1⅛-in. rivets provided with countersunk heads, long enough to extend through the plate and a short distance into the casting to ensure a thoroughly water tight joint. The castings are designed with a shoulder which butts against the ends of the curved plate, as shown in one of the illustrations, for a distance along the edge of approximately 5 ft. The casting and plate are chipped to a deep vee and are securely welded together by the electric arc process. In addition to the riveting and welding, the castings are further secured to the plate by a light weld all around the remaining portion of their edges. The center castings are also saddle shape, extended to form side bearings and are secured by 28 rivets in the same manner as the draw castings, and welded around the edges. The brake cylinder support consists of a steel casting

securely riveted and welded, and the brake lever guides are of bar stock riveted in place.

The tank barrel plates are secured to the top edges of the bottom plate by a double row of ¾-in. rivets, a tee iron being carried along each edge inside, and which extends a short distance beyond the truck centers front and back. This construction clamps the plates tightly together forming an effective stiffener and a means of attaching the transverse brace gussets. A system of transverse braces is provided over each truck center casting, and at two intermediate points, binding the bottom structure securely together. Swash plates are riveted above these braces, which also brace the barrel against distortion at its junction with the bottom plate. Longitudinal swashes are fitted from the dished head at the rear to the coal slope sheet at the front.

The front plate of the tank carries the Canadian National standard vestibule housing and spring casings. It is extended down and reinforced to form jacking arms and anchor points for the front truck safety chains and to carry the tank valves and the piping connections between the engine and tender, no bumper beam is provided at the front end. Suitable plate brackets extend out from the bottom plate between trucks to anchor the inside safety chains and to carry the equipment box and auxiliary reservoir. The rear safety chains of the back truck are carried from the bumper beam.

An equipment box of sufficient capacity to house car replacers, jacks, chains, etc., is carried between the



View showing the forward construction of the tender

trucks on the left side. Ladders and steps are provided at all four corners of the tender. The ladder at the left front corner is hinged to the front plate of the tank to swing clear of the stoker compartment should removal of the stoker engine be necessary at any time. Barco flexible joints are provided between engine and tender for the three air lines on the right side and the steam heat and stoker steam on the left side.

A standard type BK stoker is applied, the stoker engine being housed in a rectangular compartment built into the left side of the tank. A hinged door with two catches provides immediate access to the engine for inspection or oiling. The conveyor is arranged in the usual manner, the space beneath the bed plate forming a water bottom. An extra large hinged opening is provided in the back slope sheet to allow access to the gear housing, as a hole in the tank bottom for this purpose was not permissible. Three transverse filling holes are fitted on the tank barrel to dispense with the necessity for close spotting at water cranes. The feed-water connection is taken from the tank at a point near the front beneath the stoker conveyor, through a small steel casting with two outlets to which are welded lengths of pipe leading to the tank valve supporting castings, the whole being riveted and welded permanently to the tank structure. The tank valves are Canadian National standard, cam operated and are bolted to their supports.

Table of Principal Dimensions, Weights and Proportions of the Canadian National 4-8-4 Type Locomotives

Railroad	Canadian National
Builder	Montreal Locomotive Works, Ltd.
Type of locomotive	4-8-4
Service	Passenger and fast freight
Cylinders, diameter and stroke	25½ in. by 30 in.
Valve gear, type	Baker-Pilliod four-ring
Valves, piston type, size	14 in.
Maximum travel	9 in.
Outside lap	1 1/16 in.
Exhaust clearance	1/8 in.
Lead	1/8 in.
Weights in working order:	
On drivers	232,200 lb.
On front truck	66,500 lb.
On trailing truck, front wheels	33,800 lb.
On trailing truck, rear wheels	50,500 lb.
Total engine	383,000 lb.
Total tender	274,600 lb.
Total engine and tender	657,600 lb.
Wheel bases:	
Driving	19 ft. 6 in.
Total engine	43 ft. 10 in.
Total engine and tender	82 ft. 4¾ in.
Wheels, diameter outside tires:	
Driving	73 in.
Front truck	34¼ in.
Trailing truck, front	34¼ in.
Trailing truck, rear	48 in.
Journals, diameter and length:	
Driving, main	12 in. by 13 in.
Driving, others	10 in. by 13 in.
Engine truck	7 in. by 10 in.
Trailing truck, front	7 in. by 12 in.
Trailing truck, rear	9 in. by 14 in.
Boiler:	
Type	Straight top
Steam pressure	250 lb.
Fuel, kind	Soft coal
Diameter, first ring, inside	80⅜ in.
Firebox, length and width	126⅛ in. by 96¼ in.
Combustion chamber, length	48½ in.
Tubes, number and diameter	42—2¼ in.
Flues, number and diameter	167—3½ in.
Length over tube sheets	21 ft. 6 in.
Grate area	84.4 sq. ft.
Heating surfaces:	
Firebox and combustion chamber	315 sq. ft.
Arch tubes and syphons	117 sq. ft.
Tubes and flues	3,812 sq. ft.
Total evaporative	4,244 sq. ft.
Superheating	1,931 sq. ft.
Combined evap. and superheating	6,175 sq. ft.
Tender:	
Style	Vanderbilt
Water capacity	11,500 gal. (Imperial) 13,800 gal. (U. S.)
Fuel capacity	20 tons
Wheels, diameter outside tires	34¼ in.
Journals, diameter and length	6 in. by 11 in.
Rated maximum tractive force	56,800 lb.
Weight proportions:	
Weight on drivers ÷ total weight engine, per cent	60.8
Weight on drivers ÷ tractive force	4.08
Total weight engine ÷ combined heat. surface	62
Boiler proportions:	
Tractive force ÷ comb. heat. surface	9.2
Tractive force × diam. drivers ÷ comb. heat. surface	672.5
Firebox heating surface ÷ grate area	5.12
Firebox heating surface, per cent of evap. heat. surface	10.2
Superheat. surface, per cent of evap. heat. surface	45.7

A Jackson oil filter is applied and the feed water heater condensate and stoker exhaust pipes are carried into it. Track sprinklers are provided between the trucks, supported from the equipment box on the left side, and the auxiliary reservoir support on the right side. All pipes passing through the bottom plate of the tank are welded inside and outside, no flanges or screwed connections being employed.

The tanks are carried on two Commonwealth six-wheel trucks, with Canadian National standard 34¼-in. steel tired wheels and 6-in. by 11-in. journals, American

Steel Foundries clasp brakes being fitted. A Symington swivel-butt Type D bottom-operated coupler in connection with Miner friction draft gear and Farlow attachments completes the equipment.

These tenders present a neat appearance and give evi-

View showing the method of securing the castings to the bottom plate of the tender

dence of standing up well under the severest kind of service on both freight and passenger trains.

The Engine and Trailer Trucks

The engine truck is a four-wheel outside bearing truck with floating bushing bearings, grease lubricated. The truck wheels are steel tired with cast-steel spoke centers. The truck frames are of Commonwealth design and are equipped with the Economy constant resistance lateral motion devices. The truck boxes are of Vanadium cast steel. High grade cast-iron fixed bushings are pressed in, and 7-in. by 10-in. bronze bearings revolve between the journal and the iron bushing. A removable collar on the end of the axle holds the bearing in place and, at the same time, by its lateral movement pumps the grease into the bearing. The cover contains a removable plug for applying grease. A 3/8-in. bronze liner is applied on the inside face of the box.

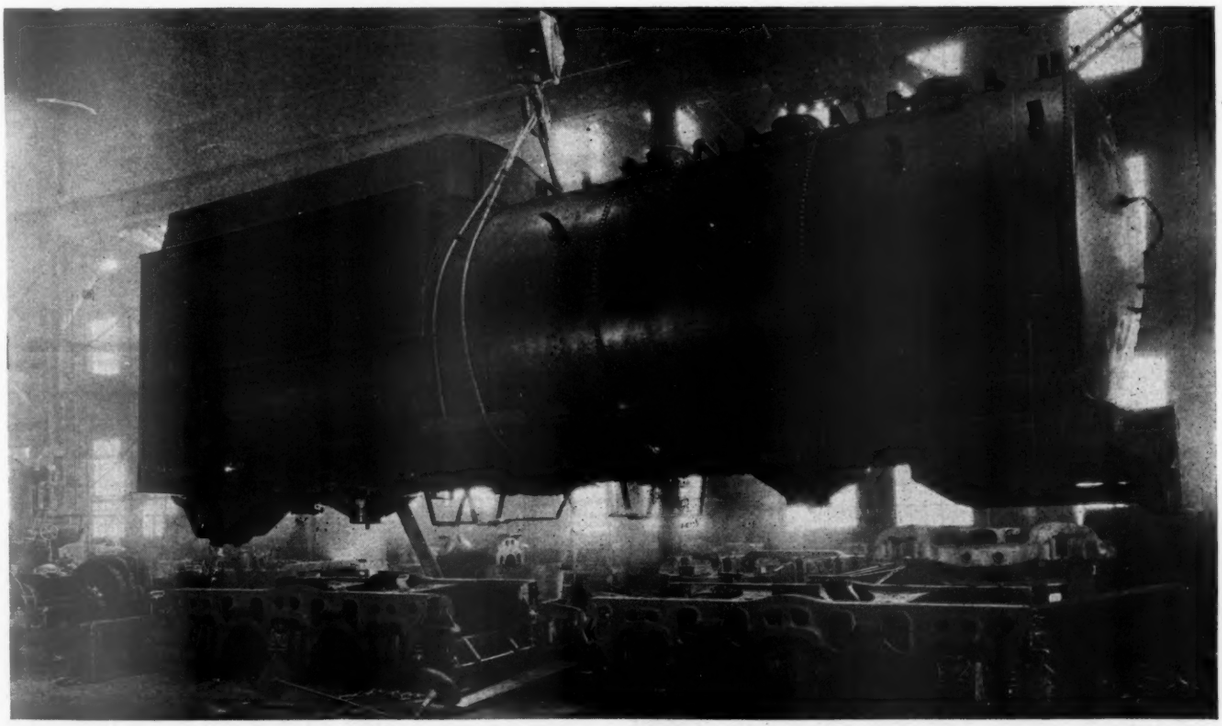
The trailing truck is of four-wheel Commonwealth design, having steel-tired wheels 34½ in. in diameter on the front axle and 48 in. in diameter on the rear axle. The front axle floats with a total lateral of 1¼ in., while the rear axle has a total lateral of 3/8 in. The boxes are of the floating-bushing type, similar to the engine-truck boxes, and are grease lubricated.

The boiler is of the straight-top type, with a radially stayed firebox. The inside diameter of the front course is 80⅞ in., and the outside diameter of the largest course is 90 in. In order to save weight the shell courses have been made of silicon steel having a tensile strength of 70,000 to 83,000 lb. and a minimum yield point of 38,000 lb.

The main driving boxes are equipped with floating bushing bearings developed on the Canadian National. All other driving boxes have the standard bearings with Franklin grease cellars and driving-box spreaders. The back end of the main rod and the intermediate side-rod connection are also equipped with floating bushing bearings of Canadian National design.

The locomotives are fitted with the Baker valve gear, with a maximum travel in forward motion of 9 in., set to give 1-5/16-in lap, 5/16-in. lead, and 1/16-in. exhaust clearance. The piston valve is of the four-ringed type.

The cylinders and valves are lubricated by four-feed Nathan mechanical lubricators of 16 pints capacity for long runs. The auxiliaries are lubricated by a three-feed Detroit hydrostatic lubricator which is located in



Photograph taken in the erecting shop looking toward the rear of the tender as it is about to be lowered onto the Trucks

the cab. The Alemite system of grease lubrication is applied to valve motion, spring rigging, lateral-motion device, knuckle pins, shoes and wedges, wheel hubs, brake pins, tender-truck swing bolster, hanger pins and equalizer pins.

The cab is of the short-vestibule type, of steel construction with wood lining. Canadian National standard turrets are located in front of the cab. The left turret is supplied with superheated steam by a 3-in. pipe leading from a connection on the superheater header, while the right turret is supplied with saturated steam from a direct connection to the boiler. Superheated steam is supplied to the air pump, feedwater-heater pump, stoker and headlight generator, while saturated steam is supplied to the steam-heat line, inspirator, lubricator and other small auxiliaries.

The whistle—Canadian National standard four-chime—is located on the left side of the smokebox near the stack, on the 3-in. superheated-steam line, and is operated by a wire cable carried through the handrail on the left-hand side.

A common exhaust pipe on the left side conveys exhaust steam from the air pump and feedwater pump through a tee-connection into the feedwater heater located on top of the smokebox.

The main frames are of nickel-carbon steel, annealed, while the cradle castings are of Commonwealth design. The shoes and wedges are of cast iron, except at the main boxes. The main shoes and wedges are of bronze. The cylinders are of nickel iron, with Hunt-Spiller bushings in both cylinders and valve chests. The pistons are of Canadian National standard built-up type, with Hunt-Spiller bull rings and Universal sectional piston packing rings.

Special Equipment

The locomotives are equipped with the Type BK stoker, Elesco feedwater heaters, C. F. pumps, Type E superheaters, American multiple throttles, Precision reverse gear, two Thermic syphons in the firebox, cast steel grates, and the Alco lateral motion device on the front drivers. Other special equipment includes a Hancock inspirator on the right side, an improved type Ashcroft cut-off control gage and air-operated cylinder cocks. The main axles are open hearth hammered steel. The main crank pins, side and main rods and piston rods are of nickel steel. The springs are of carbon steel except in the engine trucks.

Reinforced body construction used in lieu of the customary underframe

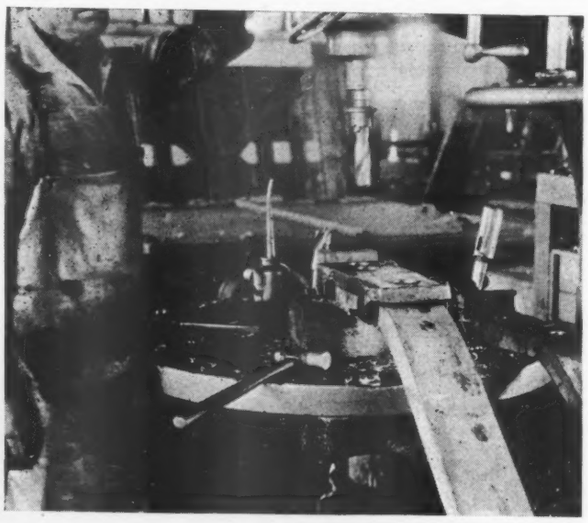
In accordance with Canadian National practice the combined automatic and straight air equipment is provided on tenders, a quick-action triple auxiliary reservoir and double check valve being employed. In this case an 18-in. brake cylinder with a Type L triple valve is applied, the triple valve functioning as an ordinary Type P.

Two World locomotive blow-off valves are located on the right side of firebox which can be operated in unison from the cab. Both blow-off cocks are connected to an L. & C. sludge remover. One has an internal pipe connection along the bottom of the barrel extending to within two feet of the front tube sheet, while the other has a pipe connection across the throat with openings opposite the side water legs.

Special Templates for the Drill Press

By Joseph C. Coyle

WHEN drilling holes in a quantity of flat steel bars, all laid out alike, a considerable saving of time may be made by the preparation of a special template fitted with case-hardened floating bushings which can be used for laying out the holes for guiding the drill and for holding the coolant.



A template for drilling holes in flat stock

The template is made of a section of ⅞-in. steel with sufficient width to accommodate the widest bar to be drilled. A 2½-in. or 3-in. section of ½-in. by 2-in. metal, with a set screw inserted near one end, is welded to each corner of the template. By using long set screws, the template may be held firmly on bars of different widths. The holes in the template are made large enough to receive the floating bushings, which serve to center the drill. A series of templates may be made for different kinds of work. The length of the template is determined by the maximum number of holes that will be bored at one setting.

I. R. M. B. A. officers for 1929—Left to right: J. P. Reid (Mo. P.) first vice-president; J. J. Haggerty (N. Y. C.), president; R. F. Scott (Reading), second vice-president; and W. J. Mayer (M. C.), secretary

Blacksmiths Hold Thirty-Third Annual Meeting at Detroit

Oxy-acetylene shape cutting, heat treatment of steel and railway spring making are among subjects discussed

THE thirty-third annual convention of the International Railroad Master Blacksmiths' Association was held on August 20 to 22 inclusive at the Fort Shelby Hotel, Detroit, Michigan. The total registration at this meeting was 222 of which 95 were members of the association. The registration of master blacksmiths' was 15 greater than at last year's convention in Chicago and during the past year 25 new members have been added to the ranks. At the opening session addresses were made by Frank Lodge, a Detroit attorney, welcoming the association to the city and by A. L. Woodworth, a charter member of the association.

The several reports presented before the convention and discussed by the members were on the subjects of autogenous welding, heat treatment of steel, machine forging, spring making; reclamation and safety first work. The greatest interest this year seemed to be on the subjects of the shape-cutting machine, the heat treatment of tool steels and spring making. During the discussion of the paper on autogenous welding and cutting, the question of the use of the shape-cutting machine came up and the remarks that were made indicated the need of a more thorough study of the uses of this equipment on the various classes of work. The discussion of heat treatment of steel and spring making emphasized the need of modern shop equipment so that increased production may be assured with a confidence of uniformity in the quality of the finished product.

One of the most significant indications of progressiveness in this association was indicated by the action taken on the last day of the convention. For several years past, there has been a sentiment among some of the members of the association that the organization might receive a great deal of benefit by a closer coordination of its activities with those of other national organizations the functions of which are of an educational nature in connection with the forging, testing and treating of modern steels. In the past one of the obstacles to this has been the construction of the by-laws of the association fixing the time of the annual meeting. The place of the annual meeting has heretofore been selected by a vote of the members at each annual meeting. This year, the members voted to amend the by-laws and to clothe the executive committee with the necessary authority to select the time and place of the next annual meeting. It was explained by one of the

members from the floor that this action would enable the executive committee to consider the advisability of the association holding its annual meetings co-incident with those of other national organizations between which a community of interests exists and, if desirable, have the authority to fix the time and place of the meeting so that the greatest value to the membership would result.

The following committee reports were presented and discussed: "Autogenous Welding and Cutting," by W. J. Wiggin (B. & M.) North Billerica, Mass., and A. McDougal (Bangor & Aroostook) Derby, Me.; "Carbon and High Speed Steel and the Heat Treatment of Steel" by L. Woodrum (C. & O.) Huntington, W. Va. and P. T. Curley (I. C.) East St. Louis, Ill.; "Drop and Machine Forging and Tools and Formers" by F. B. Dell (G. T. W.) Battle Creek, Mich., J. Lundquist (Union Tank Car Co.) Whiting, Ind. and C. K. Abbott (St. L.-S. W.) Tyler, Tex.; "Spring Making and Repairs" by H. S. Wheal (Wab.) Decatur, Ill., S. Lewis (C. N.) Winnipeg, Can. and J. H. Chancy, (Georgia) Augusta, Ga.; "Reclamation" by W. Smith (M. P.) Hoisington, Kan. and G. H. McLeish (A. T. & S. F.) Chicago and "Safety First" by H. Loughridge (P. & L. E.) McKees Rocks, Pa., R. Cronier (A. C. L.) Tampa, Fla. and M. J. Music, (M. P.) St. Louis, Mo.

After the discussion of the committee reports on the last day of the convention the following officers were elected for the year 1929-1930: President, J. P. Reid, (M. P.) Kansas City Mo., first vice president, R. F. Scott (Reading) Shillington, Pa., second vice-president, W. J. Wiggin (B. & M.) North Billerica, Mass., W. J. Mayer (M. C.) was re-elected secretary-treasurer. The following members were appointed by the incoming president to serve on the executive committee for the ensuing year: George Hutton (N. Y. C.) Albany, N. Y., W. C. Scoffield (I. C.) Chicago, J. J. Eagen (N. Y., N. H. & H.) New Haven, Conn. and G. W. Kelly, (C. of N. J.) Elizabeth, N. J.

Executive officers of the Blacksmith's Association for 1929—left to right; Jos. Grine (N.Y.C.); L. C. H. Wiedeman (Big Four); Geo. W. Kelly (C.N.J.), chairman, and W. C. Scofield (I.C.)

The Heat Treatment of Steel

By L. Woodrum

Chesapeake & Ohio, Huntington, W. Va.

This recommended practice covers the process to be followed in the heat treating of plain carbon tool steel.

Normalizing of tool steel before hardening—Operations: Heating and cooling. Heating—Place steel in furnace, so as to expose maximum surface area. Heat uniformly to a temperature above the critical point, about 1475 to 1525 deg. F. Cooling—Remove from furnace and cool freely in air.

Heating treatment of plain carbon tool steel—Operations: Heating for quenching, quenching and tempering. Heat the steel uniformly from 1410 to 1460 deg. F. for hardening. After hardening draw back at a temperature of from 400 to 500 deg. F.

General—The recommended practice for the heat treating of tool steel applied to the high quality performance of tools for general purposes only. For specific application, where special structural requirements seem to be necessary, deviation from the recommended practice must be left to the judgment of the individual.

Normalizing—A normalizing treatment for all tool steels is recommended to obtain a uniform and refined grain structure, which enables the operator to predict the behavior and performance of the tool steel during heating and quenching for hardening. The variation in temperature for the different carbon ranges becomes evident upon examination of the critical range. A low normalizing temperature for high carbon steels (1.25-1.50 per cent carbon) which fails to break up the massive cementite, results in a brittle structure, since the rate of diffusion of the excess cementite depends upon the temperature. The higher normalizing temperatures apply to the lower carbon ranges; the lower temperatures to the higher carbon ranges. In other words, normalizing temperatures of steel vary indirectly

as the carbon percentage rises or falls. Normalizing temperatures of steel vary directly with the percentage of carbon.

Heating and quenching—The wide range of temperature in the .65 to .80 per cent carbon steel is needed for a number of tools around the low point, and because of mass and forms require somewhat higher temperatures for quenching.

Quenching—Water is the universal quenching medium and by varying its temperature and manner of application for the abstraction of heat, almost any degree of variation of structural conditions of the tool steel can be obtained. There are, however, special cases where oil may be a more suitable quenching medium.

Recommended practice for high speed steel—heat treatment

This recommended practice covers the process to be followed in the heat treating of high speed steels, heating for annealing, cooling and heating for hardening, and quenching and tempering for secondary hardness.

Heating for annealing—Heat slowly and uniformly to a temperature of 1600 deg. F. and hold for complete adjustment and for complete uniformity of grain.

Cooling—Cool in furnace, or any medium that will permit of uniform slow cooling.

Heating for hardening—(a) Preheating—heat slowly and uniformly to 1,500 deg. F. in a furnace of sufficient size. (b) Heating for quenching—transfer preheated steel to a higher temperature furnace that is maintained at a temperature of from 2,250 to 2,400 deg. F., depending upon the types of tools being hardened.

In order to obtain the most satisfactory "red hardness" conditions, the steel should be brought rapidly to the higher temperature; but in many cases the character of the cutting edges of certain form tools, such as milling cutters, threading tools, etc., makes it inadvisable to use the higher temperatures, owing to destruction of the delicate edges through blistering, pitting, etc. It is, therefore, usual to use the higher temperatures for tools such as rough lathe tools, while the finer class of tools is hardened at the lower temperature.

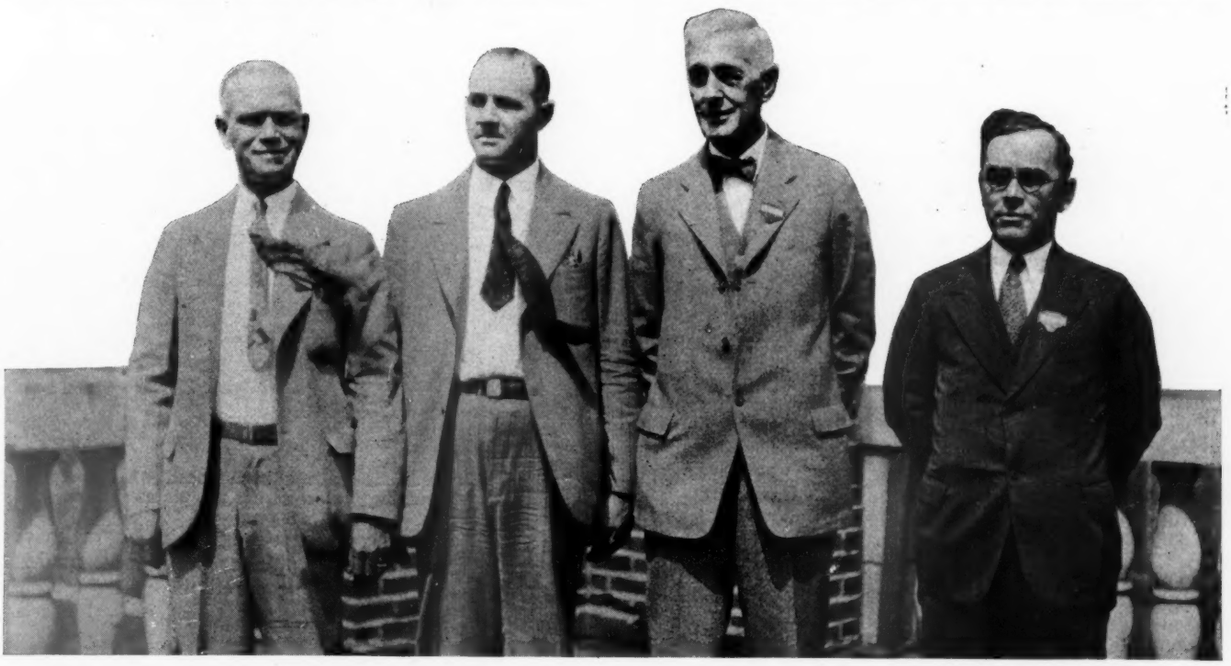
High speed steel should not be held at the high heat longer than necessary, since holding at the high hardening temperatures causes excessive grain growth, which subsequently causes brittleness of the hardened tools. Tools that cannot be ground after hardening are often heated in some suitable bath.

Quenching—Quench the steel in oil or air from the hardening temperature. It is advisable to maintain the oil quenching bath at a temperature of from 150 to 200 deg. F. to eliminate possibility of breakage with intricately shaped tools.

Tempering for secondary hardness—Reheat uniformly in an open furnace to a temperature of from 1,050 to 1,150 deg. F., for a sufficient length of time and cool in the air.

Cooling from annealing—Cooling in air should not be permitted, since air cooling from the annealing temperature is likely to result in partial hardening of the tool.

Heating for hardening—It is the customary practice always to preheat for hardening in an open furnace, since preheating in a salt bath causes the salt to adhere to the tool, and the subsequent high temperature treatment causes unusual corrosion from the salt. Even preheating in lead is objectionable because small quantities of lead adhere. Quenching from the tempering temperatures is not advisable with high speed steel.



Officers of the Master Blacksmith's Supply Men's Association—Left to right; A. E. Jones (Crucible Steel Corp. of America), chairman of entertainment committee; W. A. Champieux (Oxweld Railroad Service Co.), secretary; C. D. Harmon (Chambersburg-National), president; E. J. Jackman (Firth-Sterling Steel Co.), vice-president

Shop Tools and Formers

By F. B. Dell

Grand Trunk Western, Battle Creek, Mich.

The master blacksmith who is in a position to draft a rough sketch of some particular tool he has in mind whereby a much cheaper and better forging can be pro-

duced, and submit it to the tool room or experimental department to be carried out to completion is indeed for-unate.

Oftentimes a job is done in the old fashioned way simply because a foreman uses good judgment in not making a tool because there would not be sufficient of that particular work to pay for making one, while on the other hand, it sometimes pays to make a tool for a single intricate shaped job. In such cases a foreman has a wonderful opportunity to display his good judgment.

The following are the practices in our forge shop which is fairly well equipped and employs thirty-five men.

A first class machinist is maintained at all times for the laying out of dies, tools, formers and the upkeep of equipment.

We have no drop hammers or automatic cutting machine and all forgings such as main and side rods, motion rods, draw bars, spring and brake hangers, piston rod nuts, cylinder cock slides, whistle levers, clinker hooks, crank pin and crosshead pin collars and many other forgings are manufactured in loose former tools under the various steam hammers.

The ends of all forgings, after cooling are sawed to exact length on a cold saw eliminating the expensive operation of end facing in the machine shop, with the exception of some cases where perfect squaring up of ends is necessary. One-sixteenth inch is allowed for this purpose.

Two small bull-dozers equipped with former tools and dies for bending all sizes of pipe clips, clinker hook and ash hoe handles, angle irons, rings, grab hooks and many other light jobs have proved to be labor saving machines.

Angle iron safety bars, various shaped arch tubes, foot board hangers and several other cold bending operations are performed in special dies on powerful hydraulic bull-dozers.

In the application of high-speed steel dovetailed tips to punches and high-speed steel inserts to the punching dies, we have found a most economical method in the up-keep of punches and dies for punching the slot holes in spring plates. When the original carbon steel dies and punches become worn or chipped beyond repair they are annealed and the high-speed steel inserts and tips are applied. Tips and inserts are kept in stock for each size of holes. They can be changed in a few minutes by the removal of four cap screws. In this manner, the expensive forging machine work and heat treating of complete new carbon steel dies and punches is eliminated as we all know it is only the cutting edges that wear out. An illustration and detailed drawing of this method are shown in Figs. 1 and 2.

We manufacture piston valve stems 30½ in. long on one end and 36 in. long on the other end with a 4-in. collar in the center on a 3½-in. Ajax forging machine.

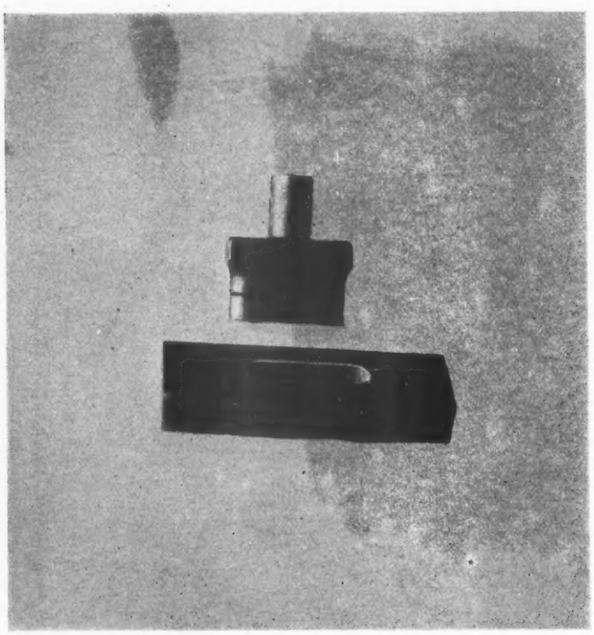


Fig. 1—Punch and die with a high speed steel insert for punching holes in spring plates

To do this a steel casting forming what is ordinarily known as the plunger and plunger holder was made in one piece with a 2⅝-in. hole cored through the length of casting, this forming the short end of valve stem. The long end projects out in front of machine against the back stop. A 4-in. collar cannot be withdrawn from a 3½-in. forging machine in the ordinary manner. To

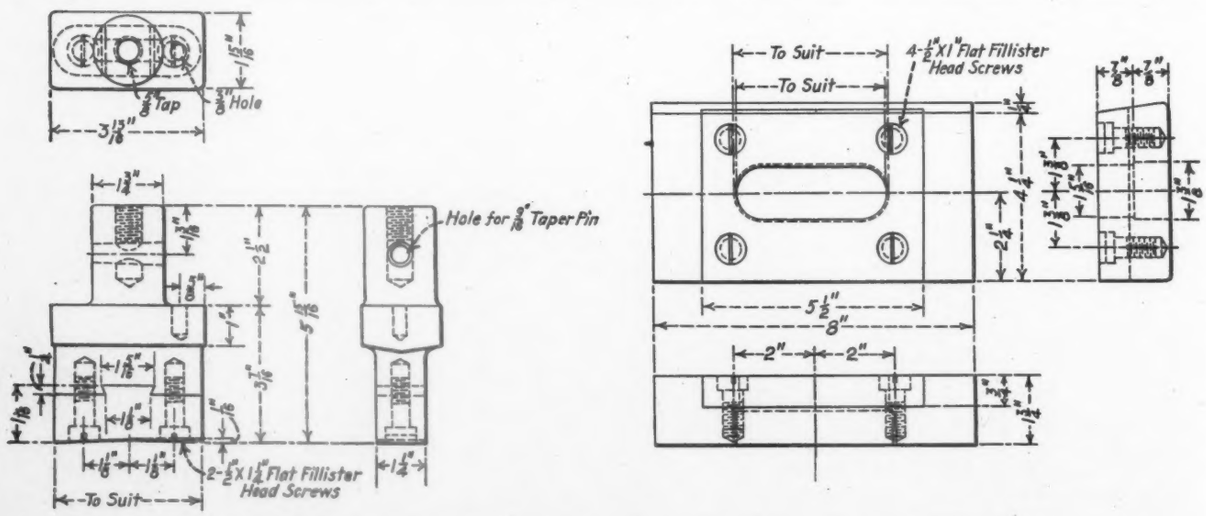


Fig. 2—High-speed steel tips and inserts in dies for punching holes in spring plates

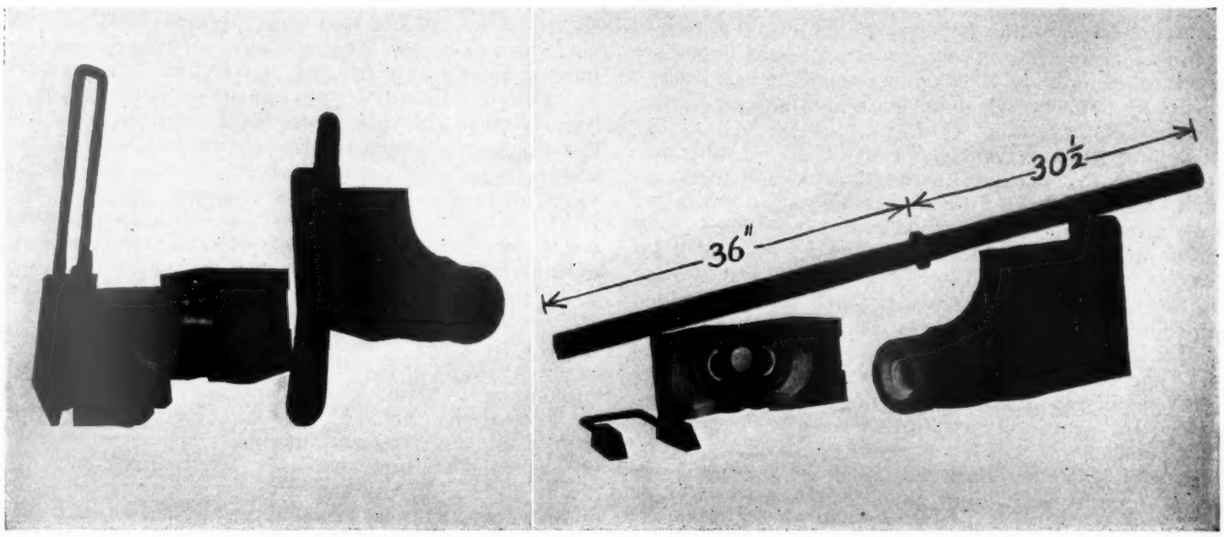


Fig. 3—Two views of the dies for forging piston-valve stems

overcome this both dies are movable. The die known as the stationary die is made 1½-in. smaller than the ordinary die. When the bar is in place with a short heat in the center to form the collar, a 1½-in. wedge is inserted behind the die bringing it out to place or alinement. After the collar is formed in one operation of the machine the wedge is withdrawn allowing the die to slide back and the valve stem is readily withdrawn from the machine. A photograph and detailed drawing of this operation is shown in Figs. 3 and 4.

About 18 months ago we installed an electric flash butt welding machine of standard make, which I believe

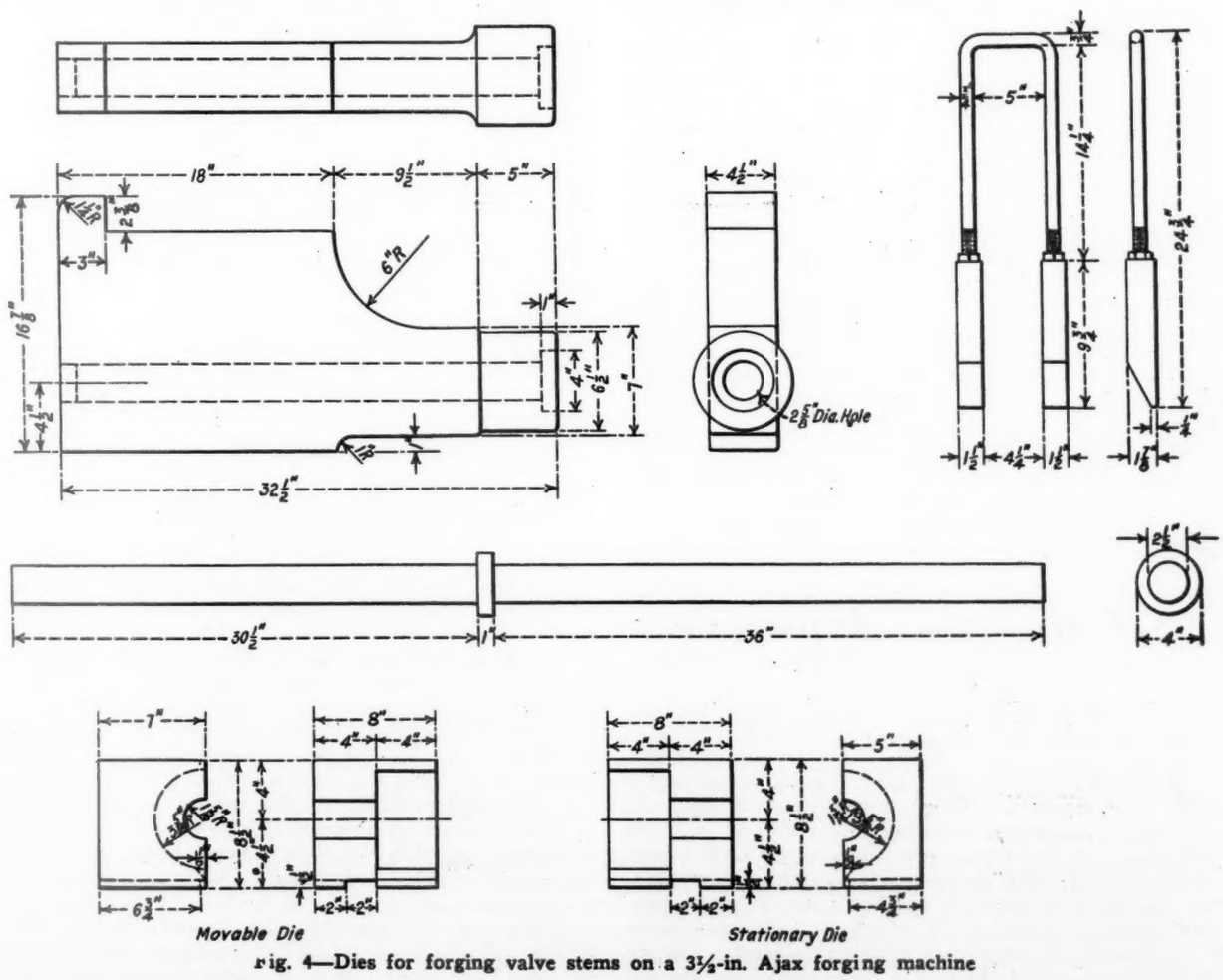


Fig. 4—Dies for forging valve stems on a 3½-in. Ajax forging machine

at that time was the only one in use in a locomotive shop. This machine in an average of eight hours per week takes care of all welding from one-half to two inches in diameter, which covers a multitude of jobs in the average forge shop.

At first we were very skeptical of the welding performed on this machine, so we took several pieces of mild steel and welded them together, after which we took several solid pieces from some bars. These were all marked on the ends and taken to the laboratory for test on a tensile machine. The result of test showed us there was but little difference between the welded and solid prices. All showing a tensile of approximately 70,000 lbs. per sq. in. If anything, the welded pieces were the stronger. Of course, the operator must become familiar with and master the technique of determining the proper temperatures on the various metals being welded.

A weld performed on a butt welding machine is upset or larger at the point of the weld than the remainder of the bar being welded. While still at welding temperature, we remove it from the machine and hammer the weld down to the size of the bar. One would naturally think that hammering while at a good welding heat, the weld would be improved. Such however, is not the case as our experience and tests have shown they are the same whether hammered or not.

To date we have reclaimed 15 monel metal feed water pump piston rods with but one failure. This metal cannot be successfully welded in an open forge fire because of the heating process being too slow but it can be done by the electric butt process.

These piston rods, which cost approximately $40.00 each, always break in the thread on the bottom end. We weld on a short piece of monel metal 2 in. in diameter of sufficient length to bring the piston rod back to its original length at a cost of $2.00 for the metal, machining $4.00 and 68 cents for welding, a total of $6.68.

In reclaiming the above piston rods in this manner a total saving of $3.32 is realized on each rod.

A time study between the forge fire and butt welding machine on welding six steel rods ranging in size from three-quarter inch to two inch in diameter, after all factors, such as labor, blacksmith coal, fan blast and electric current cost were taken into consideration, we find this work can be done at approximately one-third the cost of the forge fire method.

In installing a butt welding machine one of sufficient capacity should be considered as the larger the weld, the larger the saving realized, because it takes much more time to heat a large piece of metal than a small piece in the forge fire.

Selecting the Apprentice

By R. E. Baker
Supervisor of Apprentices, Wabash Railway, Decatur, Ill.

A GREAT deal has been said on the subject of supervisory material. A great deal depends upon the judgment exercised in selecting such material. A great percentage of the mechanical supervisors have served their apprenticeships at various crafts, but notwithstanding, except in a relatively small number of cases, how little attention is paid to the selection of the apprentices.

A foreman or a mechanic wishes to place his relative or friend or possibly merely a deserving young man as an apprentice. What kind of an apprentice? "Oh any kind, just so he can learn a trade." The well-meaning sponsor for these young men is using his heart instead of his head. True, a certain amount of deference must be given to applications sponsored by employees, but unless the list of applicants thus obtained is subjected to other tests, a series of round pegs will try to fit themselves into square holes. Most industrial concerns who offer a course of apprentice training of any consequence and a very few of the railroads demand that their prospective apprentices be high-school graduates. Whether or not this requirement is too drastic to be applied to the railroads depends, of course, upon local conditions.

Before further discussion is carried on as to most effective qualifications for an apprentice criterion, the question must arise as to what classes of apprentices are employed. The old standard regular apprentice is predominant. Helper apprentices appear on certain railroads and the process of their selection is frequently clearly defined in the employees' agreements or some other document. The special apprentice is by the nature of things a different proposition. The conditions of his employment and the more rigid training he receives, will eliminate him if he finds that he has selected an unattractive vocation.

The problem therefore, is confined to helper and regular apprentices.

The Helper Apprentice

Regardless of the regulations for their selection and whether these regulations are or are not in their favor, the selection of helper apprentices appears to be and should be the easier of the two. They have been employed for some time previous to their apprenticeship and have been under observation by various supervisors. They may have the right to exercise seniority to obtain the helper apprenticeship, but a competitive examination may be given these senior helpers to forestall the desires of those who merely wish the benefits of the periodic wage increases. Without these examinations, an opening is left to the supervisors to use personal prejudices to the advantage or disadvantage of the helper.

While it is an undesirable condition, most of the helper apprentices are heads of families, entailing responsibilities which are at times burdensome to one whose mind should be clear and receptive, yet this disadvantage is frequently offset by the steadying influence of home life, provided the family atmosphere is congenial.

Prying Paternalistic Methods To Be Avoided

Without too much prying or any methods smacking of paternalism, the officer in charge should know something of the home life of all prospective apprentices, but especially of the more mature and less plastic helper apprentice. Of the helper apprentice failures noted by the writer, an overwhelming majority are directly traceable to domestic disturbances.

Careful consideration should be given to the seniority standing of the helper apprentice. A helper say 28 years old finds himself confronted with the possibility of an apprenticeship with its attendant advantages and wage increases. He has family responsibilities, possibly a home partially paid for, but realizes that at the completion of his apprenticeship he may not be placed in service as a mechanic by his company, or may be placed in service at another point on the road. Nevertheless he accepts the apprenticeship, optimistically feeling that four years is a long way off.

Completing his time he finds himself in his early thirties, and if he is granted no seniority, possibly out of a position. True, he most likely will soon find an-

other, but it may be in another city which involves considerable inconvenience and possibly property sacrifice to say nothing of the loss to the company of a man of some six or seven years experience.

To sum up the helper apprentice situation, it will be found that some of the most notable apprentice successes and at once some of the most notable apprentice failures can be found in those who are recruited from the ranks of helpers.

The Regular Apprentice

The regular apprentice constitutes an entirely different problem. While the age limit of the helper apprentice is usually around thirty, the regular apprentice usually is accepted between the ages of sixteen and twenty-one. It is common to find certain educational requirements demanded. The application file also usually gives preference to sons of employees.

The difficult problem is to pick from this list the most promising young men. One cannot always tell from an interview, whether the boy really wants the trade or merely wants a job, or whether he is getting into this of his own free will, or because some of his elders have convinced him of its desirability. Will he show an aptitude for the craft of his choice? Will he, after being employed, get married and have his mind distracted by responsibilities too burdensome for his comparatively low wage? True, there is a probationary period of six months, but too many probationers rejected have a sad effect on the labor turn over and certainly do not tend to produce mechanics in the time expected.

All supervising officers whose duty it is to place apprentices are familiar with the "nice young man whose mother is a widow with five children" who should be given a job from the sentimental standpoint. Hard as it may seem, a successful apprentice group cannot be considered a refuge for the unfortunate, and a supervisor who places apprentices from this standpoint alone, will not get the expected results at the end of four years.

How to Avoid Mistakes in Selecting Apprentices

Regular apprentices cannot be picked by any infallible rules, but the selection of boys for whom the following questions can be answered in the affirmative will go a long ways to avoid apprentice failures.

Is his home life desirable and wholesome? Is his father a good mechanic and if so, will he co-operate with the supervisor in keeping the boy in line? Does he really desire the craft he has chosen? If he left school before his junior year in high school, was it really necessary? Are his associates of a desirable character? A knowledge of what he is interested in outside of the shop is also worth having. It is unnecessary to state that proper inquiries have been made as to his personal character and that he has been subjected to a rigid physical examination.

After checking these points and a close eye is kept on him during his probationary period, the supervising official may feel that his responsibility has been discharged and much of the rest depends, not upon the shop instructor or the technical work in the apprentice school room, but upon the boy himself. Some one has aptly said, "The education of every individual must be chiefly his own work."

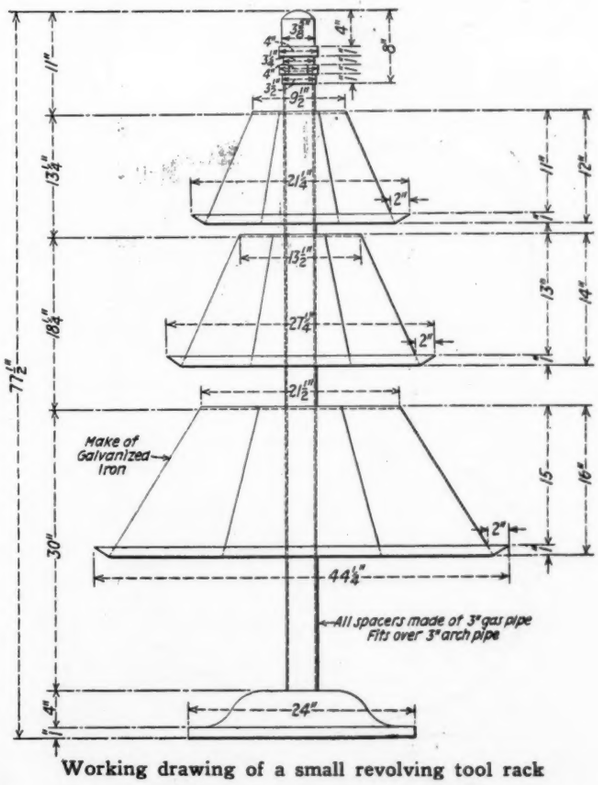
An aid in selecting employees which is being extensively used at the present by a number of prominent corporations are intelligence tests. These well thought out and scientifically planned examinations are without question indicative of certain mental characteristics, and no doubt, go a great way toward the elimination of the undesirable, but the application of these principles requires more time than the shop foreman can devote to the individual applicant and such methods must be left to the apprentice department, or the personnel manager, if one is available.

Revolving Metal Small Tool Rack

By H. H. Henson
Machine Shop Foreman, Southern, Chattanooga, Tenn.

IN the toolroom reamers, taps and large drills are usually kept on wooden shelves which require considerable floor space and are difficult to keep clean. The illustration shows a revolving metal tool rack that provides a means of keeping small tools in a compact orderly fashion.

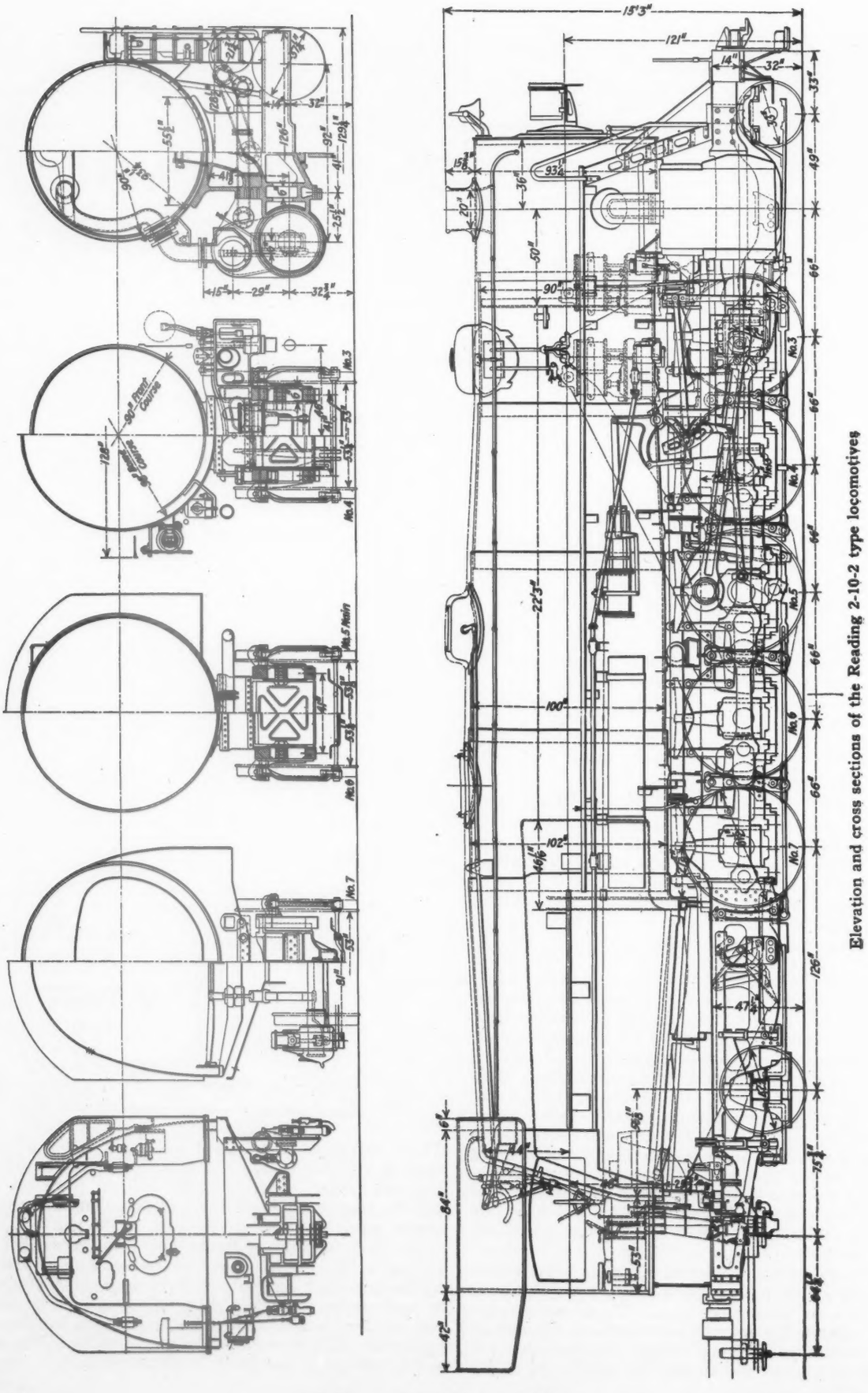
The rack consists of a length of 3-in. arch pipe which is welded into a base made from a piston-head spider.



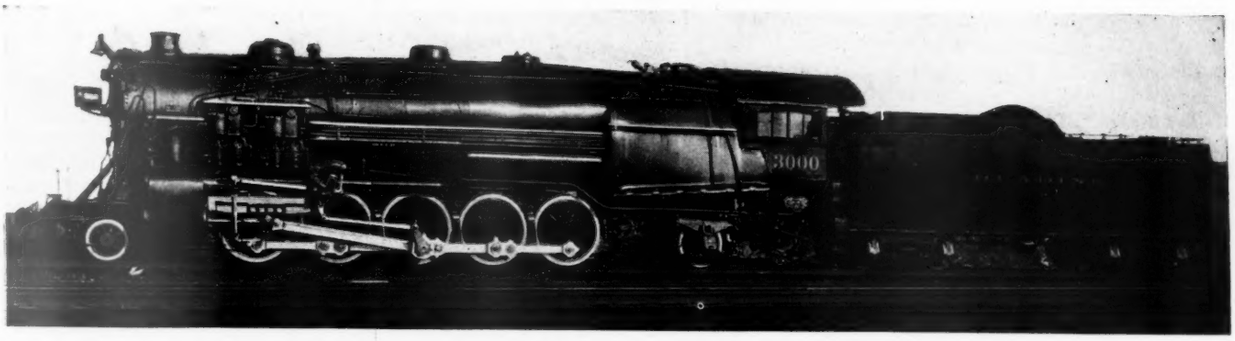
Working drawing of a small revolving tool rack

Three octagonal cone-shaped tool trays, made of galvanized iron riveted to ⅜-in. boiler plate, revolve about the pipe center. The trays are held in place on the pipe by spacers made of 3-in. gas pipe that fit over the center pipe.

The larger tray is at the bottom with the smaller at the top. The dimensions of the three trays are shown by the drawing. Each tray is divided into eight sections by angle strips welded in place. The ends of the tools rest on 2-in. ledges which run around the bottom of each tray. The overall height of the rack is 77½-in., and it rests on a base 24 in. in diameter.



Elevation and cross sections of the Reading 2-10-2 type locomotives



Reading 2-10-2 type rebuilt from a 2-8-8-2 type compound locomotive

Reading Builds Heavy 2-10-2 Type Locomotives

Built to meet demand for higher speeds—61 1-2-in. diameter drivers—Tractive force 90,500 lb.

THE Reading recently placed in service two Santa Fe 2-10-2 type locomotives which were built in its locomotive shops at Reading, Pa. These locomotives were converted from two Mallet compound 2-8-8-2 type locomotives which were equipped with 55½-in. drivers, and were designed for operation at relatively slow speeds. The 2-10-2 type locomotives have driving wheels 61½ in. in diameter and develop a tractive force of 90,500 lb. The total weight is 439,900 lb., which is believed to be the heaviest weight of any locomotive of the 2-10-2 type ever built. It compares closely with the Pennsylvania Class NIs, 2-10-2 type, which weighs 435,400 lb., of which 351,300 lb. is carried on the drivers. The total weight of the Reading locomotives is exceeded by the Texas & Pacific 2-10-4 types, which weigh 448,000 lb., but which carry a total of only 300,000 lb. on the drivers. Although the Reading 2-10-2 type locomotives are of unusually large size and weight, it is said that they can easily negotiate 16-deg. curves.

The original Mallet type locomotives, Class N1-SA, which were replaced by the 2-10-2 types, developed a tractive force of 98,400 lb. They were equipped with

Comparative Table of Dimensions, Weights and Proportions

Railroad	Reading	
Type of locomotive	2-10-2	2-8-8-2
Class	K1-Sa	N1-Sa
Builder	Reading	Baldwin Locomotive Works
Service	Freight	Freight
Cylinders, diameter and stroke	30½ in. by 32 in.	3226 in. and 40 in. by 32 in.
Valve gear, type	Walschaert	Walschaert
Valves, piston type, size		14 in.
Maximum travel	6½ in.	6¼ in. l.p. 6 in h.p.
Outside lap	1 in.	⅞ in. l.p. 1½ in. h.p.
Exhaust clearance	1/16 in.	¼ in. l.p. ⅜ in. h.p.
Lead in full gear	¼ in.	¼ in. l.p. ¼ in. h.p.
Weights in working order:		
On drivers	353,050 lb.	435,200 lb.
On front truck	31,075 lb.	23,000 lb.
On trailing truck	55,775 lb.	20,300 lb.
Total engine	439,900 lb.	478,500 lb.
Tender	228,160 lb.	
Total engine and tender	668,060 lb.	630,000 lb.
Wheel basis:		
Driving	22 ft.	39 ft. 8 in.
Rigid	22 ft.	14 ft. 0 in.
Total engine	42 ft. 1 in.	55 ft. 10 in.
Total engine and tender	84 ft. 5 in.	83 ft. 2⅛ in.
Wheels, diameter outside tires:		
Driving	61½ in.	55⅛ in.
Front truck	33 in.	33 in.
Trailing truck	42¾ in.	33 in.
Journals, diameter and length:		
Driving, main	11 in. by 13 in.	11 in. by 13 in.
Driving, others	.....	11 in. by 13 in.
Front truck	.....	7 in. by 11 in.
Trailing truck	.....	7 in. by 11 in.
Boiler:		
Type	Conical	Conical
Steam pressure	220 lb.	210 lb.
Fuel	Anthr. and bit. mixed	Anthr. and bit. mixed
Diameter, first ring, outside	90 in.	90 in.
Firebox, length and width	144¼ in. by 108 3/16 in.	144¼ in. by 108 3/16 in.
Combustion chamber, length	46 in.	46 in.
Tubes, number and diameter	244-2¼ in.	277-2¼ in.
Flues, number and diameter	58-5½ in.	50-5½ in.
Length over tube sheets	22 ft. 3 in.	23 ft.
Grate area	108 sq. in.	108 sq. in.
Heating surfaces:		
Firebox and combustion chamber	348 sq. ft.	358 sq. ft.
Syphons	98 sq. ft.	.....
Tubes and flues	5,056 sq. ft.	5,389 sq. ft.
Total evaporative	5,502 sq. ft.	5,747 sq. ft.
Superheating	1,840 sq. ft.	1,436 sq. ft.
Comb. evaporative and superheating	7,342 sq. ft.	7,183 sq. ft.
Tender:		
Water capacity	12,000 gal.	8,000 gal.
Fuel capacity	18 tons	13 tons
Wheels, diameter outside tires	36 in.	36 in.
Journals, diameter and length	6½ in. by 12 in.	6 in. by 11 in.
Tractive force	90,500 lb.	98,400 lb.
Weight proportions:		
Weight on drivers ÷ total weight engine, per cent	80.5	91.2
Weight on drivers ÷ tractive force	3.89	4.4
Total weight engine ÷ comb. heat. surface	59.8	66.6
Boiler proportions:		
Tractive force ÷ comb. heat. surface	12.34	13.7
Tractive force × dia. drivers ÷ comb. heat surface	838	760
Firebox heat. surface ÷ grate area	3.22	3.32
Firebox heat. surface, per cent of evap. heat. surface	6.32	6.23
Superheat. surface, per cent of evap. heat. surface	33.4	25.2

high-pressure cylinders, 26-in. by 32-in., while the low-pressure cylinders were 40-in. by 32-in. The boiler pressure was 210 lb. per sq. in. A comparison of the principal dimensions, weights and proportions is shown in the table.

The 2-10-2 type locomotives, Class K1-SA, have 30½-in. by 32-in. cylinders and operate with a boiler pressure of 220 lb., an increase of 10 lb. over that of the original power. The tractive force of 90,500 lb. which they develop is a decrease of 7,900 lb. from that developed by the Mallet type. They have a weight on the drivers of 353,050 lb., which gives a factor of adhesion of 3.89. Of the total weight on the drivers, 72,350 lb. is carried on the No. 1 drivers, 63,925 lb. on the No. 2 drivers, 78,625 lb. on the main drivers, 69,500 lb. on the No. 4 drivers, and 68,650 lb. on the rear drivers.

The frames are connected and braced with five heavy box-section cast steel crossties bolted to each frame. Two of these crossties serve as supports for the brake cylinders, four of which are required. Two 12-in. cylinders are used to brake the two front pair of drivers, and two 14-in. cylinders to brake the main and two rear pairs of drivers.

The boiler, except for a few changes, is the same as was used on the original Mallet type. It has a diameter of 102 in. over the largest course. The firebox is 144¼ in. long by 108 3/16 in. wide, giving a grate area of 108 sq. ft.

The main drivers are made with the solid back end, and have a floating brass bushing.

The new engines are provided with larger tenders, which have a capacity of 12,000 gal. of water and 18 tons of coal. The tender frame is of the Commonwealth cast steel type, made in one piece, and fitted with four-wheel flexible side-frame cast steel trucks having 6½-in. by 12-in. journals.

The equipment on the engine includes two Westinghouse cross-compound air compressors, Sellers exhaust-steam injector, thermic syphons, Ashcroft cut-off control gage, and du Pont Simplex Type B stokers.

Decisions of Arbitration Cases

(The Arbitration Committee of the A. R. A. Mechanical Division is called upon to render decisions on a large number of questions and controversies which are submitted from time to time. As these matters are of interest not only to railroad officers but also to car inspectors and others, the Railway Mechanical Engineer will print abstracts of decisions as rendered.)

Another Case of Rule 32

Fort Smith & Western coal car No. 5769 was damaged on the Missouri Pacific on September 12, 1927, the damage consisting of the following: Two center sills broken; four inter-sills broken; eight coal sides broken; eight coal end-gate boards decayed and broken; two end sills broken; 30 ft. of decking broken; train line bent and broken; truss rods bent and broken, and two built-up body bolsters rusted out and crushed.

The Missouri Pacific first reported the car under A. R. A. Rule 112 without waiting for reports showing the circumstances under which the damage occurred, to comply with the requirements of the per diem rule. When complete reports pertaining to the car were received it was found that the car was subject to the provisions of A. R. A. Rule 120 and disposition requested accordingly. A previous decision of the committee warranted the reversing of the responsibility where the records support such action. The Missouri Pacific also reported that the car had broken in two under ordinary handling without any of the provisions of A. R. A. Rule 32 having been violated. No car in the train had been derailed. The owner contended that the handling line was not justified in reversing its first disposition of the car. Furthermore, it pointed out that according to provisions of Rule 44 the handling line must furnish a statement to show the circumstances under which damage occurred in ordinary handling in order to establish responsibility of the car owner for the repairs. Since the timbers of the car showed no decay and no weakened condition, the owner was of the opinion that the car had been damaged in unfair usage.

In reaching its decision the Arbitration Committee stated that "from the evidence presented, the car was not damaged under any of the provisions of Rule 32 and, therefore, the car owner is responsible."—*Case No. 1595—Missouri Pacific vs. Fort Smith & Western.*

Tank Car Head Fractured in Switching Service

While S. I. M. X. car No. 1585, loaded with crude oil, was being switched on December 30, 1926, in the yard of the Indiana Harbor Belt Railroad, it was discovered to be leaking due to a 46-in. crack in the tank head at the top knuckle dye mark, at the *B* end of the car. The owner requested a defect card which was refused on the basis that the damage was caused by a hair line check that was developed at the time the head was flanged. The handling line contended that the tank head fractured in ordinary switching service and that no other part of the car had been damaged. A section of the head had been sent to the testing department which submitted a report to the effect that the material was sufficiently strong to withstand the shock and that the failure was undoubtedly due to a hair line crack.

In its decision the Arbitration Committee stated that "the failure of the tank head was due to a defect in the material. The owner is responsible under Rule 32, second paragraph." —*Case No. 1596—Simms Oil Company vs. Indiana Harbor Belt Railroad.*

Rule 32 Again

Central Railroad of New Jersey car No. 49829 was damaged on the N. Y. N. H. & H. on March 31, 1927, and was reported to the owner May 2, 1927, with a request for disposition under A. R. A. Rule 120. The owner contended that, since the car was the first one struck by four loaded cars and since the riders were unable to check the speed of the cars under six miles an hour before striking, the case should be handled in accordance with Interpretation 16 of Rule 32. The handling line contended that since the car had only two longitudinal sills damaged it did not come within the provisions of Rule 44 and as the car was not derailed, cornered, sideswiped, or subject to any unfair handling as defined by Rule 32, the defects constituted owner's responsibility.

The decision of the Arbitration Committee was to the effect that "the car was not subject to any of the

unfair conditions of Rule 32 in effect at the time of the damage. The owner is responsible."—*Case No. 1597—Central Railroad of New Jersey vs. New York, New Haven & Hartford.*

Air Brakes Cleaned Within Time Limited Because of Renewal of Broken Air Reservoir

On December 1, 1926, the Chicago & Eastern Illinois cleaned the entire air-brake equipment on Southern Pacific car No. 61367 because of a broken air reservoir. The equipment had last been cleaned on August, 1926, by the Southern Pacific. The C. & E. I. claimed that since the air reservoir had been broken it was justified in cleaning the cylinder and triple valves and billing the owner. The Southern Pacific claimed that the reservoir is not an operating part of the brake equipment and that the renewal of it is not sufficient cause for cleaning the cylinder and triple valves at the same time when otherwise in good condition.

In rendering its decision the Arbitration Committee stated that "the renewal of the broken reservoir did not justify the cleaning of air brakes within the time limit. The charge of the Chicago & Eastern Illinois should, therefore, be cancelled."—*Case No. 1598—Southern Pacific vs. Chicago & Eastern Illinois.*

Extensive and Unauthorized Repairs Claimed

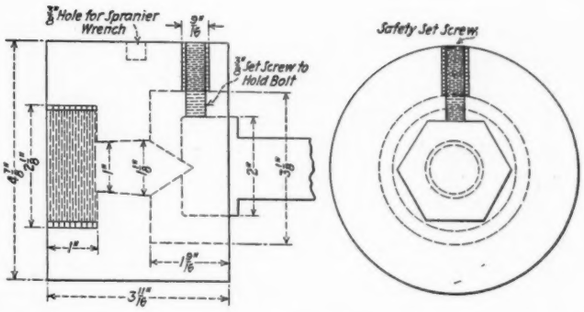
St. Louis-San Francisco cars Nos. 124235, 34003 and 30721, were repaired by the Wheeling & Lake Erie during October, 1927, for which repairs the owner declined payment, claiming that extensive repairs had been made in violation of Supplement No. 1, Rule No. 1, Paragraph b, effective August 1, 1927. The repairing line claimed that the repairs made were necessary for the safety of the lading and of the trainmen.

The Arbitration Committee sustained the repairing line in the following decision: "The repairing road had no direct connection with the home road. The cars in question were not subject for disposition under Rule 120. Your committee has analyzed the details of repairs made to the three cars and finds no exception to the statement of the repairing line that the repairs were necessary for the safety of the lading and trainmen."—*Case No. 1592—St. Louis-San Francisco vs. Wheeling & Lake Erie.*

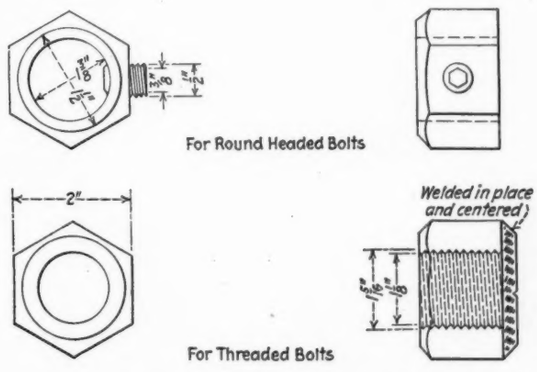
Handy Chuck for Machining Bolts

By J. A. Pullar
Driving-Box Foreman, St. Louis-San Francisco, Springfield, Mo.

THE lathe bolt chuck shown in the illustration has, after several years of service, proved its superiority over the conventional lathe dog from the standpoint of safety and increased production. The chuck, which is 4⅞ in. in diameter, is bored and threaded at one end so that it can be screwed onto the end of the lathe spindle. The other end of the chuck is machined to receive the bolt head which centers itself on the lathe center. The bolt is kept from turning by a ⅜-in. set screw with square threads. When round-headed bolts are machined, the bolt head is held in a hexagon-shaped bushing which is put into the chuck and held in place by a set screw. If it is necessary to machine a stud on a lathe, one of the threaded ends is screwed into a hexagon-shaped bushing which is threaded inside to receive the stud. A centered plate is welded on one end of this bushing so that it can be centered in the chuck. This bushing is also held in place by the regular set screw. Different sizes of these bushings must be made to accommodate various sizes of studs and bolts. Spanner-wrench holes ⅜ in. in diameter are provided for quickly applying the chuck.

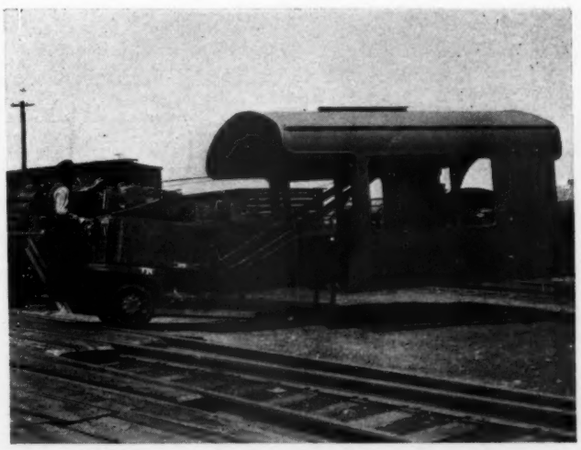


Principal dimensions of the bolt chuck which is screwed into the lathe spindle

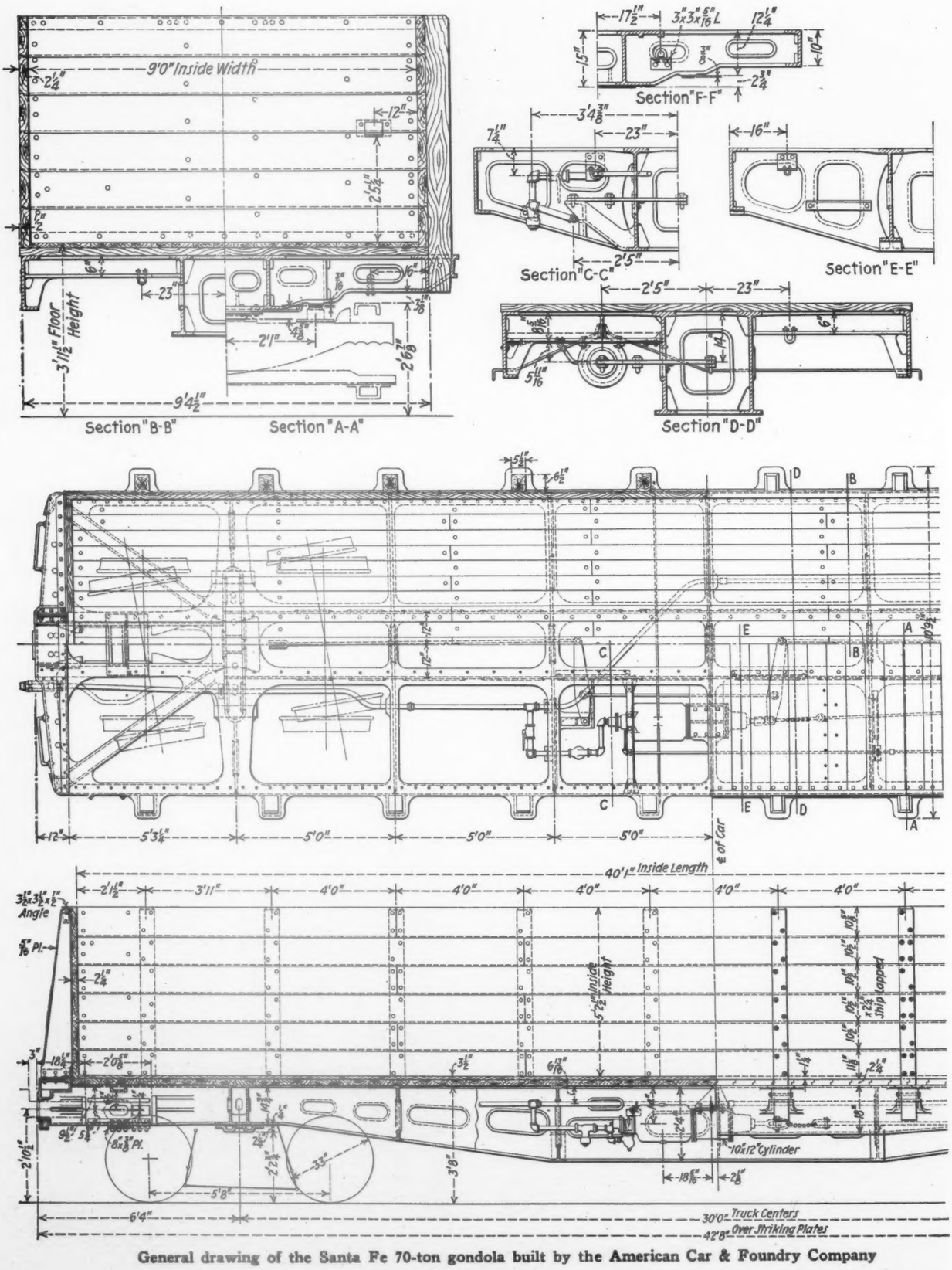


Two different bolt holders for use in the chuck

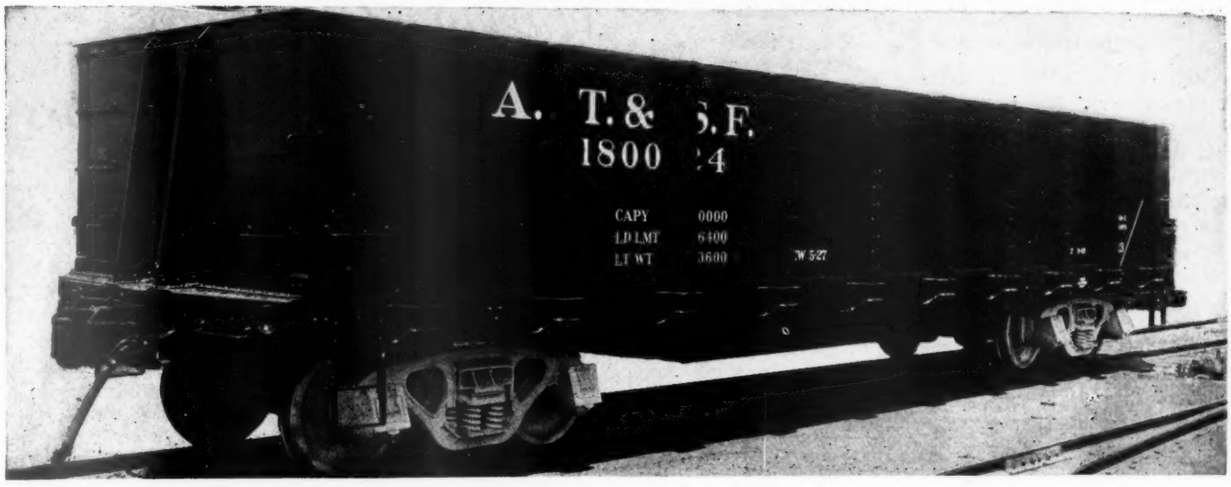
* * *



Cabs weighing from 1,500 to 2,000 lb. can be easily handled with the crane type truck as shown above



General drawing of the Santa Fe 70-ton gondola built by the American Car & Foundry Company



Santa Fe 70-ton gondola built by the American Car & Foundry Company

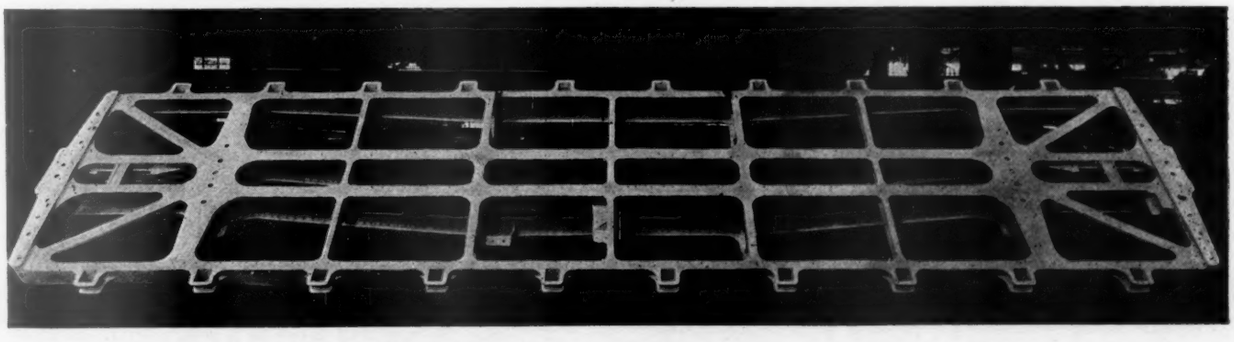
Santa Fe Gondola Has Cast Steel Underframe

Casting for car used in Texas sulphur trade weighs 19,000 lb.—Resistance to corrosion advantageous

THE Atchison, Topeka & Santa Fe received, in 1927, an order for 150 gondola cars of 70-tons capacity each, 53,500 lb. in weight and 40 ft. by 9 ft. by 5 ft. 2½ in. inside dimensions. These cars, built by the American Car & Foundry Company, have two features of more than ordinary interest. First, being intended for the transportation of sulphur between Texas mines and the docks at Galveston, the cars are made as highly resistant as possible to the combined corrosive action of sulphur and an atmosphere impregnated not only with moisture and salt from the Gulf of Mexico, but with sea shell dust which, accumulated in past centuries, is found in large deposits in that part of Texas.

Since cast steel has much higher resistance to corrosion than pressed steel shapes, the latter material is used as little as possible in the construction of the car and all parts of the underframe are made in a single steel casting which weighs 19,000 lb.

Second, the fact that these cars are not interchanged but are used on a single road and territory, transporting but one commodity and being subject to uniform loading and operating conditions, makes it relatively easy with careful supervision to secure accurate information regarding the comparative performance of various specialties used on the cars. For example, seven different types of draft gears were applied to cars built in 1927, and periodical inspection is being made of the various specialties and performance records are kept. After the cars have been in service a sufficient length of time, it will be possible to determine what the comparative service



The One-Piece Cast Steel Underframe Furnished by the Commonwealth Steel Company

performance of all the different appliances has been.

Underframe of One-Piece Cast Steel

Steel underframes for freight cars are usually made of pressed steel shapes riveted together, but the underframe for the Santa Fe sulphur car is made in a single steel casting, manufactured by the Commonwealth Steel Company, Granite City, Ill. Included in this casting are the center and side sills, bolsters, end sills, all cross members, diagonal braces and stake pockets. The buffer blocks or striking castings, the draft lugs, and the brackets for the air-brake cylinder and reservoir are cast integral. The center plates on the underframes applied to cars built in 1927 were riveted, but on later frames these are also being cast integral. The draft-gear pockets will take any standard gear meeting the A. R. A. dimensions. This cast steel underframe is not only highly resistant to corrosion but, owing to careful distribution of weight where needed, it possesses unusual strength and is expected to require less in the way of maintenance than a fabricated steel frame. The weight is slightly more than that of a fabricated steel frame of equivalent strength.

Other parts of the sulphur car superstructure include end-sill angles riveted to the underframe and pressed-steel end stakes united to the corner posts and diagonal braces by end chord angles. These, the only fabricated steel parts of the car, are made of copper-bearing steel. One-half of the required number of side stakes are 5½-in. by 6½-in. yellow pine; the remaining side stakes are cast steel and the side and end plank of 2¼-in. pine.

A double course wood flooring is laid in the car to serve as a protection against the severe service encountered in loading and unloading with grab buckets. The lower floor, laid crosswise, consists of 2¼-in. ship lapped yellow pine and extends under the side and end planks. The top floor, laid longitudinally with butt joints, is made of 1¼-in. yellow pine, secured to the underframe by 1½-in. carriage bolts fitted with No. 2 Grip holding nuts. This top floor extends only to the side and end planks so that it can be readily removed and replaced where necessary.

American Steel Foundries cast steel bolsters with the Barber lateral motion device and Dalman type truck frames with integral journal boxes are used on these cars; also Cresco No. 2 Plus brake beams and Schaefer drop-forged Type B brake levers. The side bearings are of the Barber single roller type. Air brake equipment is of the Westinghouse schedule KD-1012 type with special tested air brake fittings. Train lines applied to cars built in 1927 are made of leadized pipe furnished by the Locomotive Terminal Improvement Company, Chicago; later cars are to be equipped with copper-bearing steel pipe and leadized nipples. The hand brakes are designed to develop the full braking power on the car. The cars built in 1927 are equipped with Ajax and Klasing hand brakes.

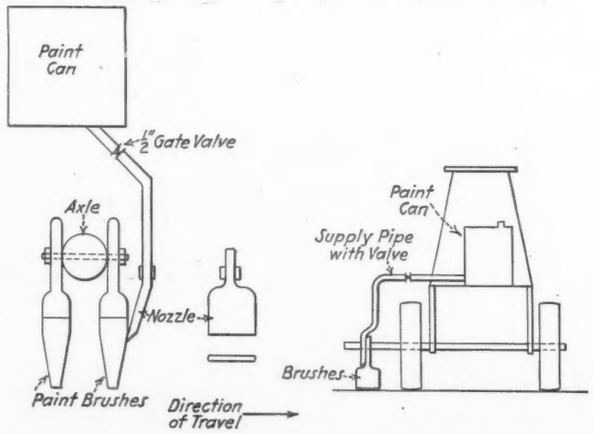
Among other materials being tested on the cars built in 1927 are the 33-in. wheels which consist of three different types: Rolled-steel multi-wear wheels, furnished by the Illinois Steel Company; double-plate cast iron wheels, by the American Car & Foundry, and single-plate reinforced flange wheels, by the Griffin Wheel Company. The 6-in. by 11-in. journals are equipped with Magnus metal bearings and Sates bearings. Spring packing is used in the journal boxes. Type M journal-box lids, furnished by the Railway Steel Spring Company, are applied to these cars. Both Thornburgh and Chaton dust guards are used. The 6-in. by 8-in. couplers are of the A. R. A. standard D type with Imperial uncoupling arrangement.

Marking Off Lanes On Shop Floors

IN many large industrial plants and railroad repair shops it has become common practice to mark off with white lines lanes or paths which are to be kept clear at all times. These lanes are used by industrial trucks with trailers, or by hand trucks, to deliver material and supplies to and from the store rooms and between departments. It is, therefore, important that the borders of these lanes always be kept marked plainly to avoid delays in the handling of supplies and materials through the various departments of the shop.

A recent inspection of several railway shops showed that the borders of these lanes were painted on by hand and, upon inquiry, it was found that it required from ten to twelve man-days each week to keep them in shape.

A small border painting rig, similar to the one shown in the illustration, can easily be made in any shop to do this work. Two men using it can do the same work as



Device for marking off lanes on shop floors

ten men using brushes. Two men will make better progress than one, since one of them can go ahead and move anything that may be lying on the border, thereby allowing the man operating the machine to keep in motion and eliminating the necessity of shutting off the valve located between the supply can and the two paint brushes.

The border marker is made by mounting a pair of hand-truck wheels on an axle, one end of which is extended and on which are mounted the two paint brushes. These brushes are made the width of the border line desired. A frame is built onto the axle which serves as a support for the five- or ten-gallon paint tank. A feeder pipe leads from the tank down to the front paint brush. The outlet of this pipe is placed against the brush near the top of the bristles. A control valve is placed in the supply line between the brushes and the supply tank.

The front brush distributes the paint and the second brush smooths it out to an even finish. The brushes are placed on the right side so that the man operating the rig will be going with traffic and will not be walking on the fresh markings. Placing "fresh paint" signs at intervals along the line will serve as a reminder to workmen, not to step on the line.

Canadian Pacific Portable Lumber Painting Machine

Saves labor and material and does not endanger the health of the workmen

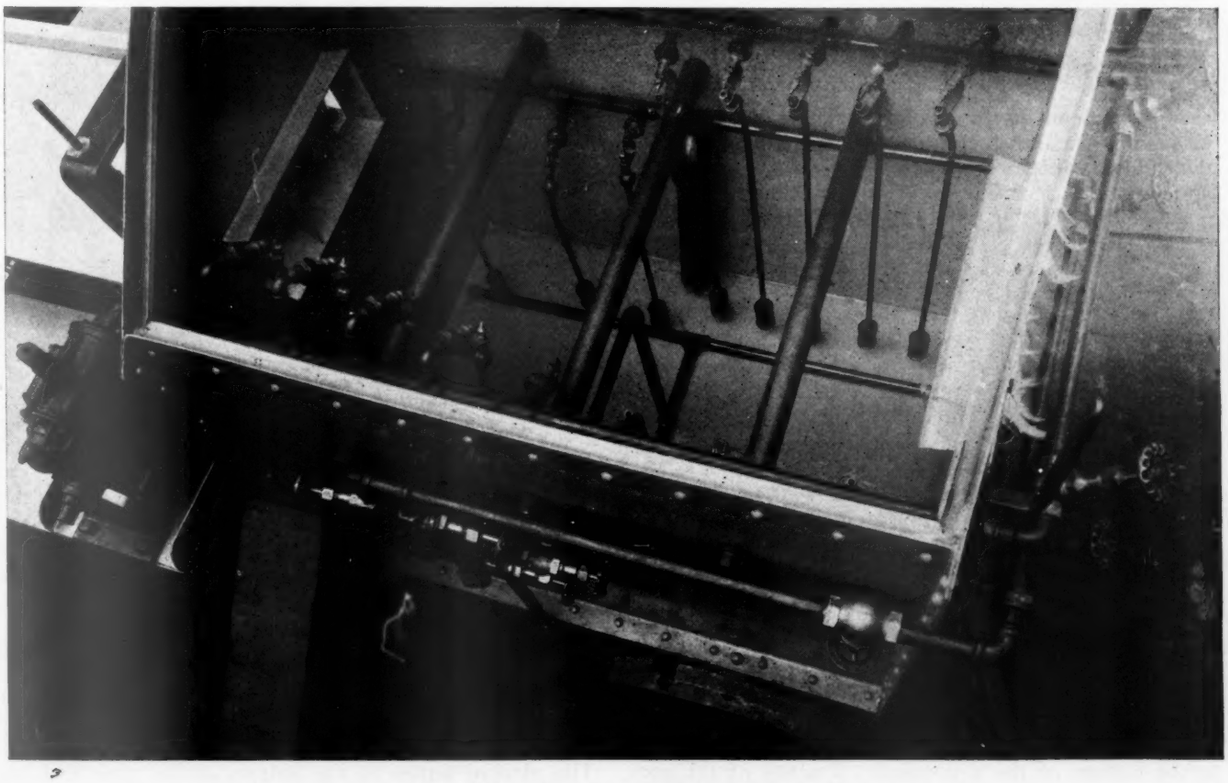
THE large passenger-car and the freight-car repair shops of the Canadian Pacific, which form a part of the Angus shops located at Montreal, Que., require each day approximately 100,000 lineal feet of painted lumber. Formerly this lumber was painted by hand. This required much labor, wasted paint, the boards were not painted uniformly, and it was not possible to meet the demands of the car shops.

The brush method of painting lumber has been replaced by a patented totally-enclosed portable painting machine, the output of which is wholly dependent upon the rapidity with which the lumber can be fed into the machine.

The construction of the machine can be roughly divided into four principal parts: The spraying chamber, the feeding mechanism, the spray condenser and the air dryer. The machine, which is supported on four wheels, is encased in sheet steel so that it can be readily cleaned and is made weatherproof so that no water can enter. The detachable roof over the spray chamber is constructed in the form of a gable so that the paint will run down its sides back into the tank instead of dripping onto the lumber as it passes through the machine. A rectangular opening is cut in each end of the metal box so that the lumber may pass through in a horizontal position.

A platform with adjustable sides is built onto the end of the machine where the lumber enters the spray chamber. The lumber is fed through the machine by two grooved iron rollers, the lower one of which is keyed to the drive shaft of an air motor. The upper roller is adjustable to the thickness of the boards. The feeding mechanism can be adjusted to take boards 4 in. thick by 12 in. wide. Three round bars, placed parallel to each other inside of the machine on a level with the lower feed roller, serve as supports for the lumber as it passes through the machine. One board pushes the preceding one out of the machine.

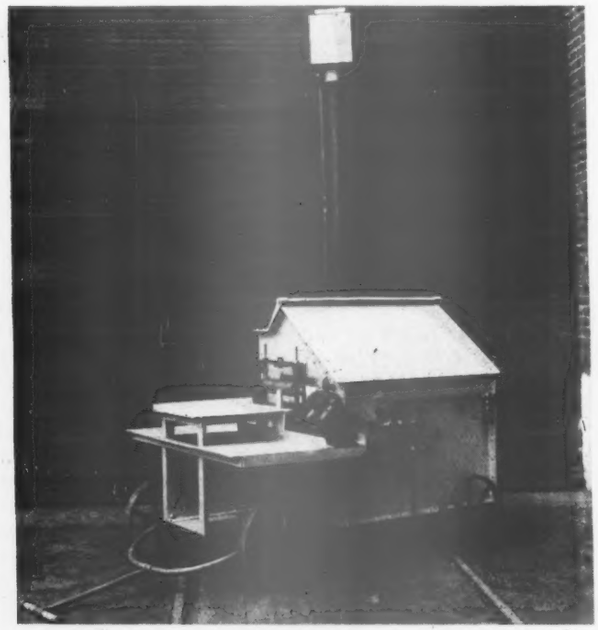
Lumber can be fed through the machine at a speed ranging from 60 ft. to 200 ft. per min., depending upon the condition of the lumber and the amount of paint to be applied. If the boards are to receive a thin priming coat, the rate of feed is increased, but if a heavy coat of paint is desired, the lumber is fed through slow-



Interior view of the machine showing the arrangement of the spray nozzles

ly. The speed is controlled by the air-motor throttle.

As the lumber passes through the spray chamber, it is painted by 16 spray nozzles, eight located on each side of the chamber. As shown by one of the illustrations, the three lower nozzles on each side of the chamber spray the lower side of the edges of the lumber, while the five upper nozzles spray the remainder of the boards. The nozzles consist of two parts: An air nozzle and a paint nozzle. The two nozzles, one containing air and one the paint material, are set at right angles to each other and the tips so adjusted that a vacuum is created, thereby insuring practically perfect atomization. The direction of the sprays can be regulated by levers located



Front view of the machine showing the feeding mechanism

at the rear end of the machine. Thus, as the lumber leaves the machine, the operator can see the amount and distribution of paint on each piece and regulate the spray nozzles accordingly. From each nozzle extends a pipe to the bottom of the tank, to the end of which is attached a screened intake. The flow of air to each set of nozzles is controlled by a series of valves located along the front side of the machine.

A ½-in. diameter agitator pipe, in which is drilled a series of ⅛-in. holes, extends across the bottom of the tank. This pipe is used to agitate the paint when starting up in the morning and at any time during the day that the paint becomes unduly thick.

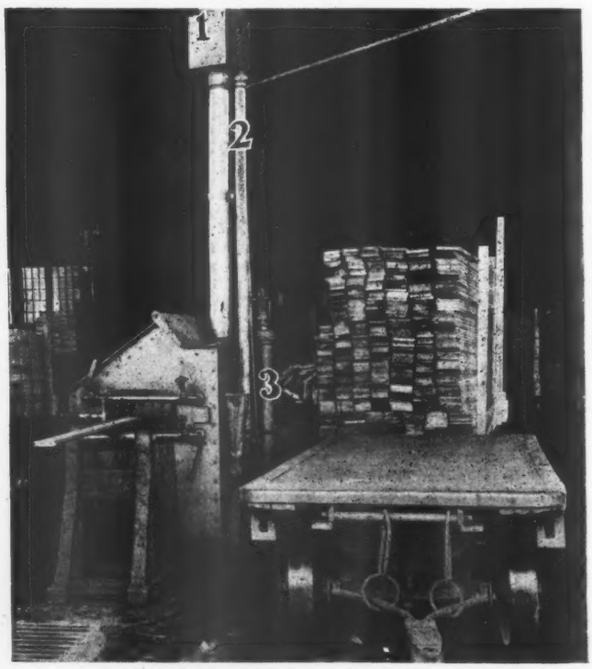
Spray Condenser

The design of this machine is such that no paint fumes or spray can escape. This makes it possible for the machine to be used indoors with perfect safety to the workmen and without covering everything in the immediate vicinity with a coat of paint. Since air pressure is built up within the chamber, it must be relieved so that fumes from the spray nozzles will not be forced out around the machine. The pressure escapes through a 4-in. diameter pipe, 5 ft. long, which connects to the bottom of the spray condensers. A ⅛-in. air pipe for accelerating the exhaust draft is also connected to the bottom of the condenser. The top of the condenser is closed with a lid which is counterweighted by a nut on a rod so arranged and balanced that the pressure of the outward flowing air will raise the cover and permit the exhaust air to escape.

The exhaust draft carries a certain amount of paint with it which would escape to the atmosphere if it were not condensed and fed back into the tank. The condenser consists of a rectangular outer metal shell in which is contained a removable rectangular core perforated with ⅜-in. diameter holes. Inside of, and attached to the sides of the perforated core, are four triangular baffle plates, which form a pyramid, the apex of which is at the top center of the core. The paint spray carried by the air exhaust into the condenser strikes these deflecting plates, condenses and flows through a 2-in. pipe that leads from the bottom of the condenser to the bottom of the spray chamber. This condenser serves the dual purpose of preventing any paint from escaping to the atmosphere and of reclaiming all paint carried in the exhaust air.

The Air Drier

An air dryer, designed to prevent the moisture in the compressed air from freezing when the machine is oper-



Arrangement of machine and trucks when in operation: 1—Spray condenser; 2—Pipe through which condensed paint flows back into the machine; 3—Air drier

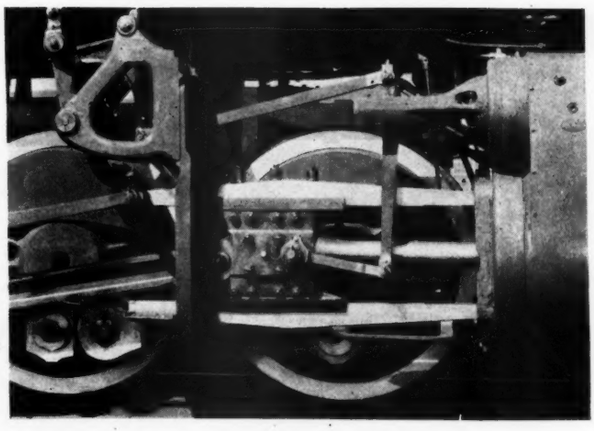
ated outdoors during very cold weather, and also to prevent such moisture at any time from getting in the paint, is attached to the rear of the machine. If the moisture freezes, it will interfere with the proper operation of the spray nozzles. The drier consists of a 4-in. pipe, 3 ft. long, into which the air supply pipe is tapped 10 in. from the bottom to permit the moisture from the air to settle there. The dry air passes up and out of the top of the 4-in. pipe into the pipe that supplies air to the spray nozzles. During cold weather a small quantity of alcohol is poured into the 4-in. pipe through a filling cock located at the top of the pipe. The alcohol settles to the bottom of the pipe and, as the air passes up through the pipe, it carries with it

a sufficient amount of the alcohol fumes to prevent any remaining moisture in the air from freezing. A drain cock is provided at the bottom of the pipe to drain off the water at any time during the day.

Operating Data

The spray tank, which normally holds 50 gal. of paint, can be filled either through the removable roof or through a funnel permanently attached to the reclaimed paint pipe, which leads from the condenser to the spray chamber. The location of this funnel and the air dryer is shown in one of the illustrations.

Four attendants are usually required to operate the machine, two for passing the lumber through the machine and two for piling up the painted lumber. During a recent test run with a full crew of four men operating the machine, 42,657 lineal feet of lumber was painted in eight hours by one machine. The quantity of paint used during the day's run was 35.85 imperial gallons, averaging 1.121 gal. for each 1,000 sq. ft. of surface, or 892 sq. ft. per gallon. The labor cost per 1,000 lineal feet was 31 cents and the material cost per 1,000 sq. ft. covered, $1.23. The labor cost includes all operations necessary for attending to the machine, as well as placing loaded and unloaded trucks alongside of the machine, and all of the labor involved in feeding the lumber through the machine and hauling it away. The painted lumber is taken directly from the paint machine to the cars on which it is to be applied.

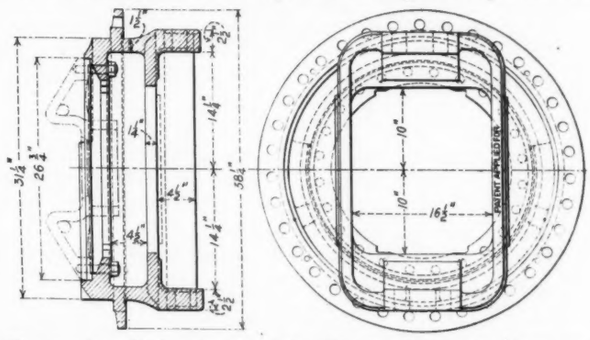


The original back cylinder head clearances were maintained in the new design

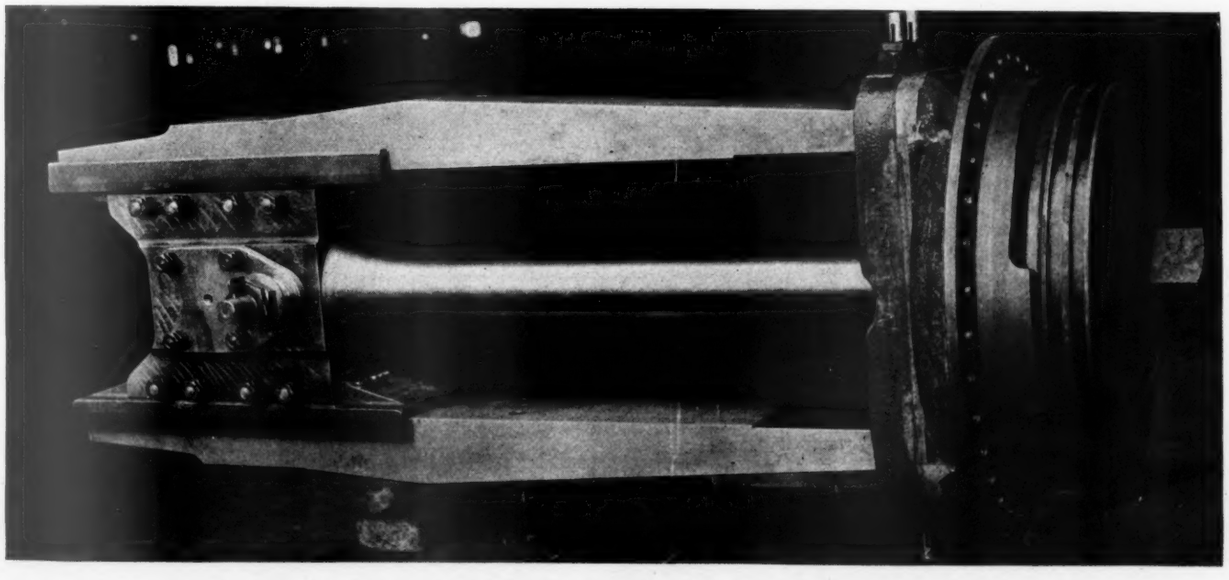
Integral Piston Rod and Crosshead

ON six of the 2-10-4 Type locomotives, built for the Chicago, Burlington & Quincy and described on page 427 of the August, 1928, *Railway Mechanical Engineer*, a new design of integral piston rod and crosshead has been applied which promises to eliminate one of the most troublesome mechanical details in the modern steam locomotive. As will be seen by referring to the illustrations, the piston rod and the crosshead body are combined into one piece so that they become a one-piece forged driving rod, thereby doing away with the keyed connection now in general use.

An investigation made by the Burlington of piston-rod failures of the past two years shows that 97½ per cent of all such failures are in the crosshead fit or immediately adjacent thereto, and it was for the purpose of eliminating



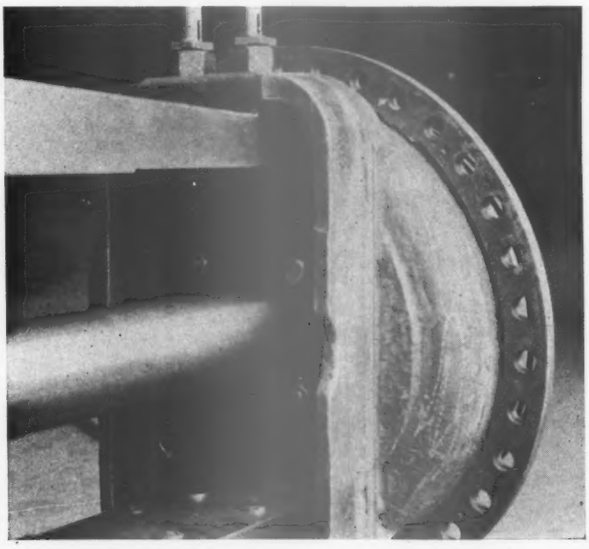
The back cylinder head used with the integral piston rod and crosshead—The outline of the inside cover is indicated on the sectional view



Integral piston rod and crosshead assembled in back cylinder head and guides

these failures, as well as many crosshead failures, that the new construction was devised by E. C. Anderson, mechanical engineer of that road.

The construction consists of the integral piston rod and crosshead, an opening in the back cylinder head large enough for the crosshead body to pass through, and a one-piece cover for that opening seating against the inside of the back cylinder head.



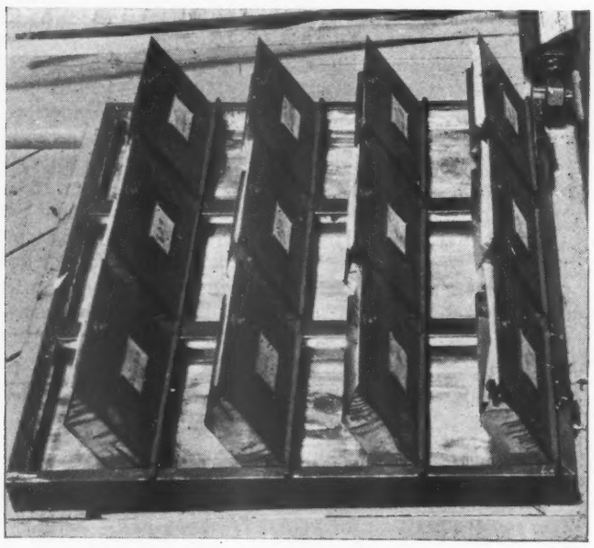
Close-up view showing one-piece cover application in back head

It is expected that this construction will easily go from shopping to shopping without any attention other than the usual renewal of packing rings, and these renewals can be made without breaking the joint between the back cylinder head and the cover. Should occasion arise, however, the integral rod and crosshead can easily be removed by taking off the front cylinder head, disconnecting the cover from the back cylinder head and drawing the crosshead forward through the hole in the back cylinder head.

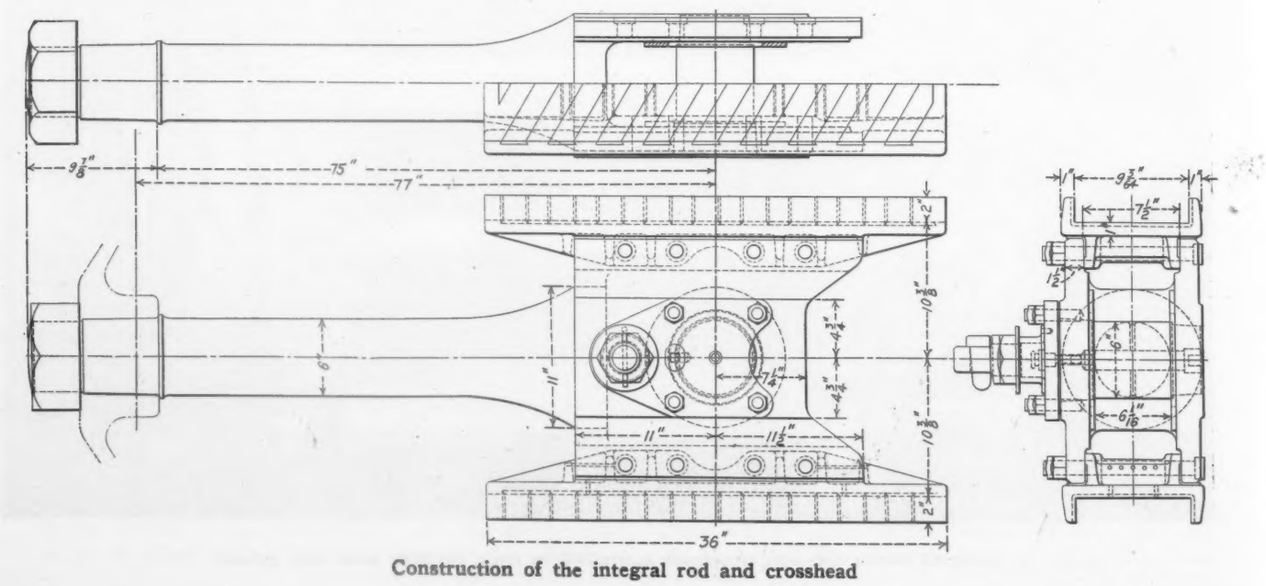
In assembling the parts the piston-rod packing gland, the retaining ring, the spring packing filler ring and the inside cover for the opening in the back cylinder head are applied to the piston rod before the piston head is pressed on. Application has been made for patents on this construction.

A Handy Filing Cabinet

BECAUSE of the lack of an adequate desk in which to file papers, the foreman of the sheet-metal department at the Denver shops of the Denver & Rio Grande Western made a sheet-metal filing cabinet which is used for keeping the carbon copies of shop and material orders. The cabinet is about 24 in. square by 2 in. deep and contains 12 tin pockets, or drawers, which tilt forward when open, giving free access to the contents. Four small rods are soldered across the cabinet to form hinges for the drawers. Small strips of tin, soldered to the top of each drawer form a slot for an index card. A small button soldered to the front of the drawer is used to pull it open.



Compact cabinet for filing shop or material orders or other papers



Construction of the integral rod and crosshead

Maintenance of Lifting Chains and Devices

All lifting devices are inspected monthly and annealed every three months under the supervision of one foreman

THE following letter to the editor, which was published in a previous issue of the *Railway Mechanical Engineer*, requested pertinent information concerning the inspection of shop lifting chains and wire cables and devices. The maintenance of lifting chains and cables is thoroughly organized and systematized at the major repair shops of one trunk line, and a description of the methods there employed will answer most of the questions set forth in the letter which is reprinted below.—EDITOR.

Can the readers of your magazine furnish any information on the subject of proper or standardized methods of testing and inspecting locomotive shop lifting chains and cables? Some chains are only used approximately once a week, others several times a day; hence a regular time limit for all chains is not desirable.

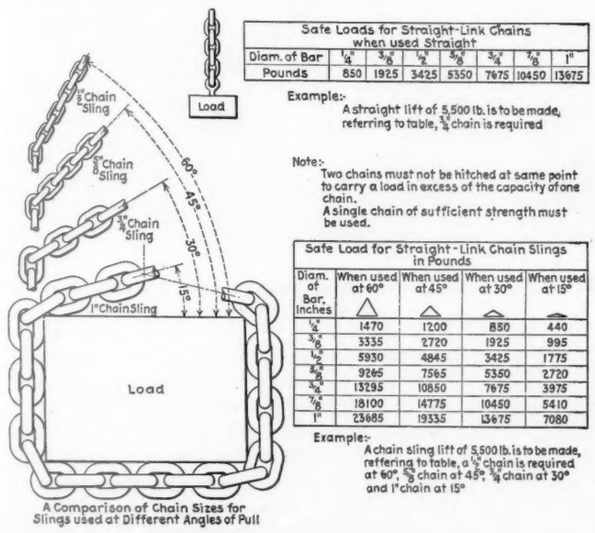
Some, I find, say they normalize them every month. How is this done? At what temperature? Who in the organization is responsible for seeing that the chains are normalized when they are being used in various departments under different foremen? After normalizing, what then? Who inspects them and how is it done? If one or more links are found checked, what is done about it? Is the whole chain scrapped, or are links renewed and who decides what to do about the condition found?

What system is best to insure that a chain is not overloaded? What is done regarding chain hoists? Are these chains ever normalized or heat treated or annealed, or whatever the process is called? What is the difference anyway in these processes, as I am advised that in different shops each of these various methods is followed. Which proves to be the best?

What is the rule regarding cables on lifting cranes? Does length of service have any bearing on the problem? If on inspection one or more wires or strands are found broken, what is done about it? How many wires may be broken and the cable still remain in service? Who makes the inspection and what instructions does he work under and how often is it found best to inspect them?

Answers to these questions or a discussion on this subject would be of interest to many who are responsible for keeping down accidents while keeping down costs as well.

In the shops referred to all chains, lifting beams, hooks, clamps and other lifting devices are given identification numbers for the purpose of record. The designating number to identify the chain or lifting device is stenciled on the device or attached to the chain by suitable means, without incurring the liability of weakening it due to the imprint of the stencil. On hook chains the markings appear on the hook adjacent to the eye stenciled parallel with the hook body. On link chain the markings appear on the closing link of the chain over the welding (reinforced not less than 25 per cent) and flattened to receive the stenciling. The stenciling is made parallel to the link body.



The information contained in this chart is to prevent the overloading of chains

In the shops referred to a record card is kept for each unit of such equipment, on which is listed the identification number, date when the unit was put into service, when inspected and annealed and the repairs made. Each department foreman is charged with a certain number of lifting devices, and he keeps a record of their identification numbers and the workmen to whom they are assigned.

These devices are inspected every month and annealed every three months. When an inspection is ordered the foreman's office of each department is notified by telephone and the name of the individual taking the message is recorded so that the department foreman cannot claim that he was not advised of the inspection. Saturdays and Sundays are the days selected for the

INSPECTION OF (Elevators, Weekly / Lifting Devices / Ladders / Cranes & Runways) Monthly

Where Located	Inspectors	Numbers	Repairs Necessary

Date of Inspection:_____ Correct:_____ Foreman

Form used for reporting the inspection of chains and lifting devices

inspections. The department foreman issues orders to the workmen to place on the floor all of the lifting devices in their possession.

At the monthly inspection all lifting devices are examined for defects and those found defective are laid aside for repairs. If a chain link is found to be checked or unduly worn, it is renewed. If a chain shows an elongation of 15 per cent, it is scrapped. A record is taken of all of the chains inspected, and a form, which is illustrated, is filled out for each department. The inspectors have, for each shop, a list of the lifting devices with their numbers, and if any devices are found missing, a report is made out and sent to the master mechanic, who turns it over to the shop inspector to locate the missing devices.

Chains which show undue wear or stretch, as indicated by binding of the links or tendency to climb on hoist sprockets, are removed from service and repaired or replaced with new chains. When it becomes necessary to add new links, hooks, etc., in repairing any chain, the welding involved in this process will affect the previous heat treatment of the chain and it is necessary that the entire chain be annealed before returning it to service.

Once every three months, usually on week ends, all sling chain and hook chain used as auxiliary hitches for cranes or hoists are taken to the blacksmith shop and placed in pyrometer-controlled gas-fired furnaces for annealing. The charges are then allowed to heat up to 1,700 deg. F. and then to cool down in the furnace, after which they are removed and examined for defects.

The inspector's word is final as to the condition of the devices and what repairs should be made.

General Precautions

In the case of crane or hoist chain it is not possible to determine from a surface inspection whether the chain is made of wrought iron or steel and, therefore, because of the heat treatment usually given steel chain by the manufacturers, it has not been found advisable to attempt to anneal such chain to relieve internal stresses. Experience has shown that more damage is incurred by attempting annealing or improper reheat treatment than by leaving the chain in its original heat-treated condition.

All work of annealing or welding is, at all times, performed by competent workmen fully experienced and familiar with the importance of this kind of work. All welds are of the fire-forged type.

Inspecting Wire Cables and Elevators

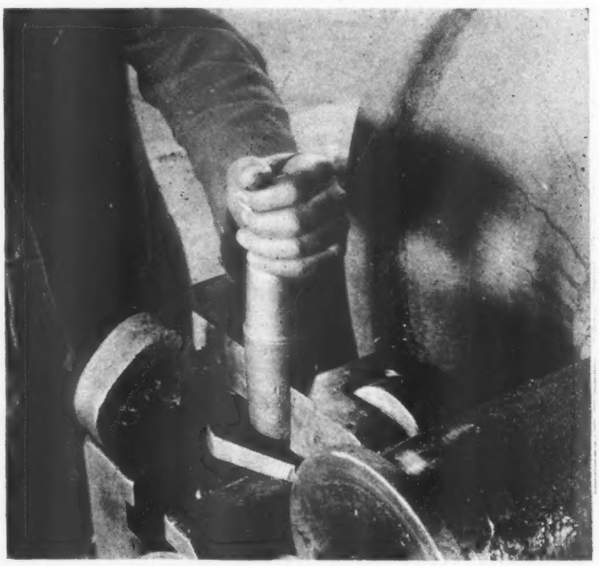
All wire cables are as thoroughly inspected as link chains. All elevator and crane cables are oiled and inspected each week. When an inspector discovers that the cable strands are beginning to break, he reports it at once to his foreman who in turn reports it to the shop inspector who examines the cables. If only a few strands are found to be broken, the lifting capacity is reduced until the cable can be renewed, which is generally over the week-end. If the cable is found to be in a serious condition, it is immediately renewed. Cables are not annealed.

The inspectors examine the crane runways for loose bolts and rivets, flat spots and other mechanical defects. The elevators are inspected every three months by a representative of a casualty company and by a representative of the state.

The dangerous practice of overloading chains is combatted by posting throughout the shops a blue print showing the comparison of chain sizes for slings used at different hitch angles. Two tables have been worked out, one giving in pounds for different diameters of bars up to 1 in. the safe loads for straight-link chains when used straight and the other table gives in pounds the safe load for straight-link chain slings when used at angles ranging from 15 deg. to 60 deg. The workmen who constantly use chains are required to familiarize themselves with the information given on the blue print so that they will not overload the chains they are using.

Holding Device for Burnishing Tools

IN rolling a car journal to a smooth surface after it has been machined, trouble is sometimes experienced in keeping the roller adjusted to give a perfectly smooth surface. This trouble can be eliminated by the use of the device, shown in the illustration, at the back



Method of holding burnishing tool so that it will not move out of alinement

end of the roller shank. It consists of a section of 1-in. by 2-in. steel bent into a triangular shape at one end. The straight end of the device fits under the roller shank. A set screw, located in the perpendicular side of the triangle is used to adjust the shank and to hold it firmly in the tool post. By its use, the machinist is able to leave the machine for a few moments without fear of the roller getting out of alinement. The device is kept from slipping by two 5/8-in. dowel pins, located on the under side of the device, which enter corresponding holes drilled in the top of the tool-post carriage.

TORCHWELD LINE.—A new 8½ in. by 11 in. catalogue, No. 29, issued by the Torchweld Equipment Company, 224 North Carpenter street, Chicago, describes the complete Torchweld line, with cross-sectional views of gas welding and cutting, lead welding, soldering, brazing and decarbonizing equipment, automatic and hand welding and cutting machines and torches, gas pressure regulators, acetylene generators, welding supplies and general information.

The Reader's Page

Takes Issue with Editor

NEW YORK.

TO THE EDITOR:

The question of the college man and the railroads is getting to be pretty much of a chestnut, but the title of the editorial in your August issue, page 479, "Where Does the College Man Come In?" promised to be worth while reading, and so I fell for it.

I am wondering how many of your readers will agree with you in the conclusion that the railroads require relatively few engineers as compared with a manufacturing industry, because "the function of the railroad is one of conducting a rather complicated and constantly more highly specialized series of non-technical operations rather than the development of machines for use in the performance of those operations." Does not the same thing hold true in most industries?

It is true that there are a few industries in such a stage of development that a large amount of engineering design is required, and these industries, of course, draw much more heavily upon the supply of engineers than do the old line industries. On the other hand, not a few of the older industries, where conditions are more or less stabilized, find use for a considerable number of trained engineers, in order to keep step with modern progress in improving their methods. Such industries are not primarily interested in the design of new machinery any more than are the railroads, but they do find it necessary to keep ever on the alert to take advantage of the latest engineering developments.

As an example, not a few engineers have established reputations with their companies because of their achievements in the utilization of material handling apparatus. Is it not true that in all departments of a railroad—in the repair shops, on the repair tracks, in the enginehouses, in track work, and in freight house and passenger station operations—great savings have been made by the installation of such apparatus? Is not this just as much of an engineering problem on the railroads as it is in the ordinary industry? Can you successfully show that engineering ability in improving methods of supervision and handling of workers is not just as important, if not more important, in the various departments of a railroad as in an industry? These examples are typical of many others which could be cited.

Are you not taking too narrow a view of engineering, particularly at this time when the nation is looking to engineers not only as waste eliminators and to improve production methods in our industries and transportation systems, but is also depending on them for assistance in solving the broader engineering and economic problems of city, state and nation? Are the railroads not losing out by failing fully to recognize the part that the trained engineer could play in helping to bring about more efficient and more economical operation?

You imply that much of the engineering design for the railroads is done by the manufacturing industries which serve them. There is a certain amount of truth in this statement, and yet is it not true that a very large percentage of the improvements which have been made in the mechanical civil engineering, electrical, signal and operating departments of railroads have been suggested and possibly largely developed by railroad men in railroad service, the manufacturing interests taking over and perfecting these improvements and putting them on a production basis that they may be widely distributed?

Let's be perfectly fair. Why not invite your readers to suggest ways in which the engineer can be used more effectively on the railroads, rather than cheerfully to sidestep the issue with the epigrammatic statement: "But to be a successful railroad man, one must be far more interested in railroading as a business than engineering as a profession." How many engineers associated with the industries are greatly concerned with engineering as a profession, any more than are the engineers in railroad service?

And while we are on the subject, do you really think the railroads are using as many engineers as they should on research work?

ENGINEER.

A Criticism From a Reader

HORTON, KAN.

TO THE EDITOR:

On several occasions recently I had cause to look up information in current railroad periodicals concerning rail motor cars, both distillate burning and Diesel, and the lack of accurate information available in published form is astonishing.

During the past year many important and interesting developments have taken place, but very little, if any, mention has been made of them. In the shop where I am employed, there were recently turned out three distillate-burning-electric locomotives of 800 hp. each. In April, 1927, two of 550-hp. each were constructed. During the course of a year several rail motor cars were given a heavy overhaul at this point.

As a leading publication of railway mechanical and technical information, couldn't the *Railway Mechanical Engineer* devote a little more space to this subject? Not merely the passing details, but the technical phases?

I am not the only one who is deploring the little amount of material pertaining to this equipment that is published. I have spoken to others here in the central west where many gas-electric units are in service, and they voiced the same sentiments. The publication of accurate, up-to-the-minute news and, from time to time, articles dealing with the elementary principles would be an asset to magazine and reader alike. It is a hard task, indeed, to try to master a good working knowledge after many years experience with steam engines.

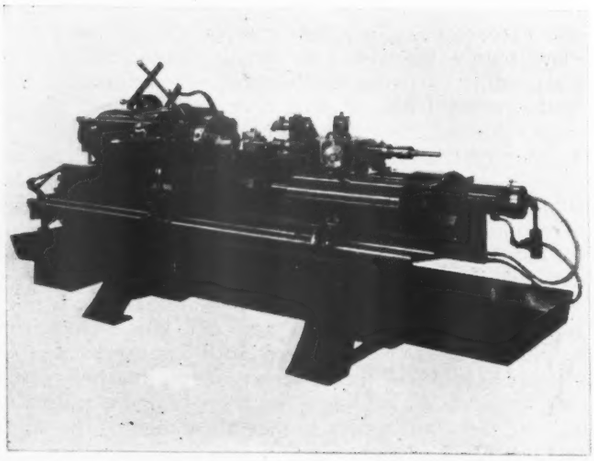
MAX E. BRETSCHNEIDER.

Fastermatic Automatic Chucking Machine

FASTERMATIC is the name applied to a new automatic chucking machine developed and placed on the market recently by the Foster Machine Company, Elkhart, Ind. The machine is built in the platen and automatic indexing turret types, each of which are now being manufactured in four sizes and symbolized 1-F, 2-F, 3-F and 4-F, with respective swings over the bed of 17 in., 22 in., 25½ in. and 33 in.

A unique feature of the Fastermatic is that the feeding mechanism-controlling movements of the tool carrying units is entirely gearless. All feeds are actuated from a hydraulic ram into which oil is forced from an oil gear control pump located on the head end of the machine and driven through a silent chain from the main drive shaft. During the period of feeding a constant oil pressure is maintained on each side of the piston enclosed in the ram. As a result, a back pressure exists on the side of the piston opposite that to which the feeding pressure is applied. This character of regulation is necessary to maintain a uniform feeding movement to the tooling when the cuts are intermittent or of irregular depth. The regulation here is fully controlled automatically through the action of the oil gear.

Foster 4-F Type Fastermatic automatic chucking machine



The feeding mechanism-controlling movements of the tool-carrying units are entirely gearless in the Foster Fastermatics

The feeding movements to the tool-carrying units range from zero to approximately 40 in. per minute. The feed changes are effected through varying the capacity of the pump and its delivery of oil to the ram. Cams, which may be easily and quickly adjusted, are provided for obtaining the desired feed and to automatically maintain the same feed after they are once adjusted.

The return of the tooling from the work at the completion of all machining operations is automatically effected through the rapid traverse action of the ram, and also the tooling is returned to position for the beginning of the cuts by the rapid traverse action, from which point the actual feeding movement begins.

At the completion of the entire operation cycle, the tooling is retained in the returned position until the feed is re-engaged by hand. Anotther feature pertaining to the feeding movement is that the rapid traversal movement can be reinstated automatically during any portion of the feeding movement which greatly reduces time on work having wide open spaces between turned or bored lengths.

The features described are generally characteristic

of both the platen and indexing turret type machine.

With the platen type Fastermatic, the tool-carrying units consist of a front and a rear cross slide and a main slide, all of which are mounted on a platen. The platen, through the action of the ram, carries the tooling to the correct position for the beginning of the machining operations and away from the work after the tooling units have receded from the position attained on completing the cutting operations to the original starting point. The movements to the platen ordinarily are rapid, but fully controllable, and when desirable can be automatically reduced to any feeding rate of travel which may be required for feeding auxiliary tooling bolted to the platen for boring, forming or turning operations.

With the indexing turret type Fastermatic the tool-carrying units consist of a front and rear cross slide mounted on a bridge spanning across the bed and an automatically indexed hexagon turret. The cross slides are adjustable longitudinally.

The hexagon turret advances and returns automatically, and the entire action is effected from an oil ram located central between the ways at the rear. A rapid traversal movement places the turret to position for starting the boring and turning operations. From this position, the turret continues at a predetermined rate of travel, selected as a proper feeding movement.

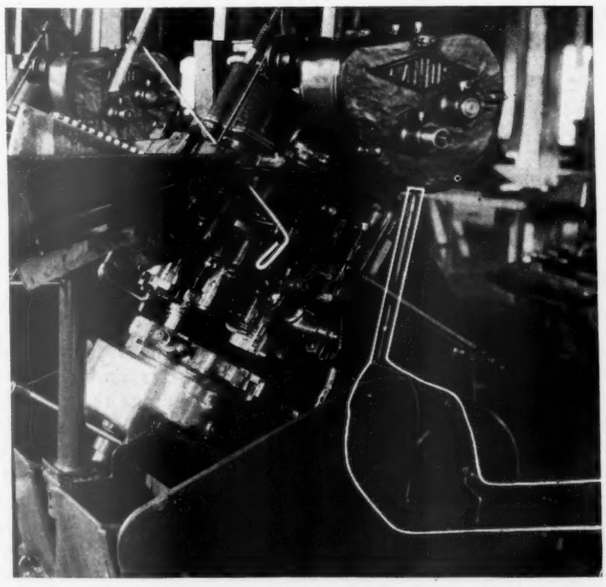
The longitudinal movements of the turret are controlled from the action of a cam—one for each face—which regulates the volume of oil entering the ram. The cams are carried on a spool and index automatically in correct relation to the faces of the turret. Each cam is adjustable and a separate and independent feed for each face of the turret is readily available. The turret can be adjusted to remain in a fixed position at any returned position of the turret desired, or the full travel back and forward may be accomplished without indexing. Also, the turret is rigidly clamped before the tooling reaches the work and also is released before indexing.

The cross slides can be operated simultaneously or independently, and can be timed to operate in conjunction with any one of the turret faces. The cross action is effected through the action of the cams beneath the slides and controlled by the movement of the turret. At the completion of the entire operation cycle, the entire tooling is moved in the clear of the work and retained until the feed is re-engaged by hand. Provision is made for the use of overhead piloted tooling as well as that central piloted. Chucks such as used on the ordinary turret lathe are readily adaptable to these machines.

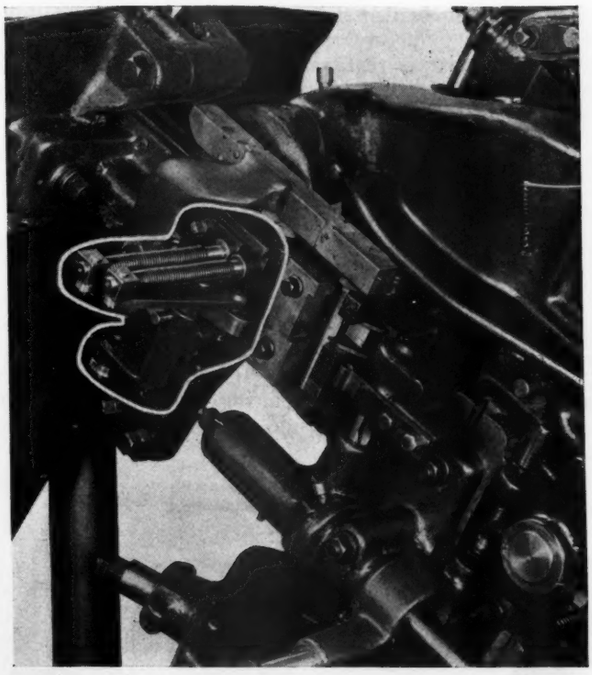
In the 1-F and 2-F machines eight spindle speeds are available, while in the 3-F and 4-F machines twelve spindle speeds are available. All Fastermatics are equipped with Timken bearing spindles, ball bearing back shafts, multiple disc clutches, and on all steel gear train operating in oil.

Features Added to Landis Automatic Threader

SINCE describing an automatic forming and threading machine manufactured by the Landis Machine Company, Waynesboro, Pa., on page 50 of the January, 1927, issue of the *Railway Mechanical Engineer,* several new features have been added to this machine. One of the illustrations shows a new escapement attachment intended to be used in connection with long hex and square-head bolts, and bolts and screws having odd shaped heads. It is built in the magazine and releases one bolt at a time at the end of the magazine, thereby relieving the bolt to be transferred to the chuck turret of the weight of bolts in the magazine and preventing



Rear delivery conveyor which carries the bolts to the handling boxes



Bolt escapement attachment built into the magazine

interference of bolt heads. This attachment covers the entire range of machines from 5/16-in. to ¾-in. diameter and from 1 in. to 6 in. in length.

Another illustration shows a new conveyor to deliver the bolts to the handling boxes. The conveyor is perforated and has an oscillating motion to move the bolts slowly toward the handling boxes, allowing most of the coolant to drain off the bolts. The coolant is collected in the trough under the conveyor and returns to the sump in the bed. Small chips are also separated from the bolts, the chips dropping through the perforations in the conveyor as the bolts move along to the handling boxes.

Although the illustration shows delivery at the rear of the machine, the conveyor can be arranged to deliver the bolts at the front of the machine.

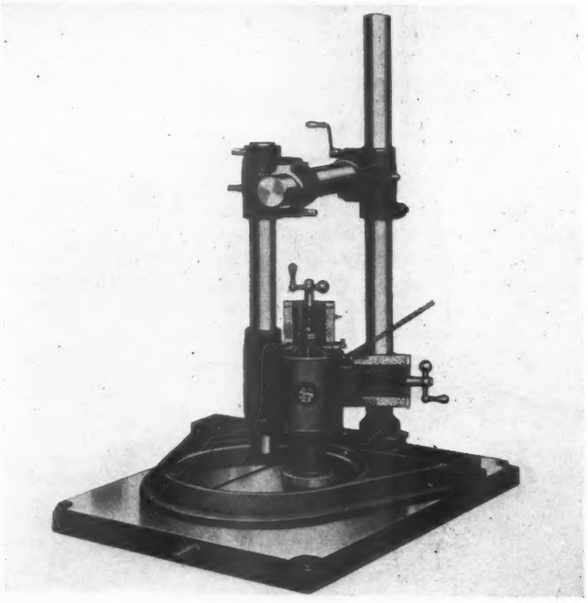
Electric Grinder for Small Flat Work

A *NEW* type of electric grinder has been placed on the market by the United States Electrical Tool Company, Cincinnati, Ohio, which is especially designed for surfacing die blocks and grinding flat work of all kinds within a minimum circumference of 24 in.

The motor is a 2-hp. Westinghouse, running on S.K.F. ball bearings. The lower bearing is a combination radial and thrust bearing. The base is machined true; its surface is 36 in. by 48 in., arranged with T-slots for clamping down work. The slots do not go through the entire table but start from the rear and extend about three-fourths of the way across the table base.

The upright column is 3½-in. steel tubing, 48 in. high. The double collar is "pinch bind". The upright is equipped with a stop collar. The cross arm is a 3½-in. steel tube, 36 in. long. The double collar is fixed. The arm holding the grinder is made of 3-in. solid cold-rolled steel. The grinder mounting collar is equipped top and bottom with ball bearings. The mounting has two adjustments, vertical 6 in., horizontal 8 in. The dovetailed slides have adjustable gibs to take up wear.

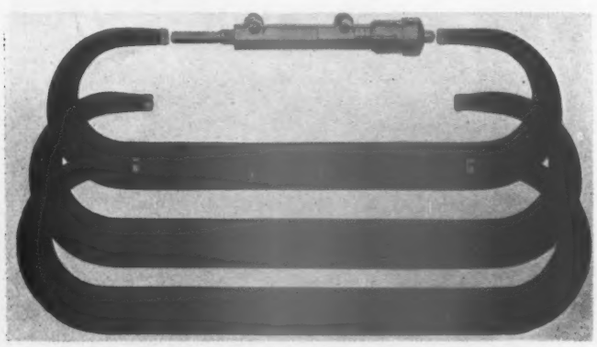
This grinder is regularly equipped with a 6-in. cup wheel and 12-ft. of rubber covered cable with a 2-piece attachment plug.



Electric grinder designed for finishing flat work with a minimum circumference of 24 in.

Kaseberg Gages for Mounting Car Wheels

THE Liberty Machine Works, 1825 North Ninth street, St. Louis, Mo., is now manufacturing the Kaseberg standardized micrometer gages used for mounting car wheels to axles. It is the development of a system which consists of pairing wheels and axles by the use of inside and outside micrometers, set to predetermined size from standard reference gages. Variations in wheel seats or in wheel bore are then indicated plus or minus from a zero line by thousandths.



Inside micrometer and reference gages

The outside micrometer for calipering axles has a thimble which is set at zero and the adjusting screw is turned until the micrometer fits one of the three standard reference gage sizes: namely, for 5¾-in., 6½-in., or 7-in. axles. Then the adjusting screw is firmly locked in place.

The large contact faces on this outside micrometer, automatically centers the gage on a line at right angles with the axis, thus eliminating inaccuracies caused by manual tilting. Accurate reading of sizes and positive measurement over high spots of the surface is assured, as the large contact faces prevent false readings where low spots are encountered. The inside micrometer is similarly adjusted by the use of a thimble and adjusting screw to the size of the inside reference gages which are provided with the correct allowance for press fit.

To fit a pair of wheels on an axle having 5½-in. by 10-in. journals, the diameter of the wheel seat of the axle would be 7 in. standard, but the bore of the wheel would be 6.985 in. to make the proper fit. To simplify

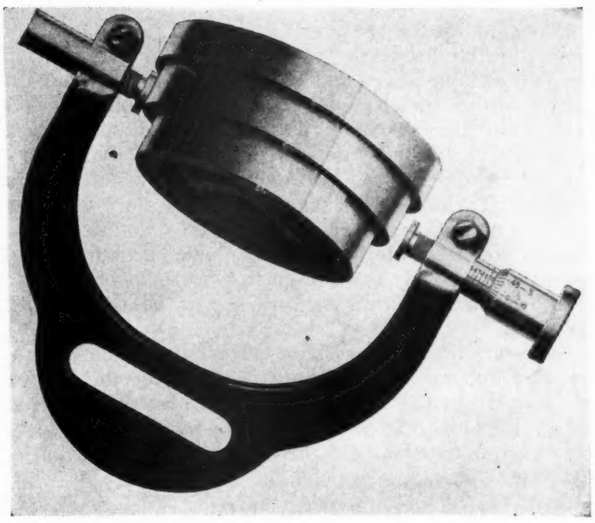
these measurements three reference gages for the inside micrometer are provided, one of which is .015 in. small for 5½-in. by 10-in. journals; another .013 in. small for 5-in. by 9-in. journals, and another .012 in. small for 4¼-in. by 8 in. journals. When a wheel is bored that fits the micrometer at the zero point, it is marked O. K. and will take the required pressure to mount it on an axle that is marked O. K.

If a bore is .005 in. large, it is marked 5-L by the workman and will fit an axle that is marked 5-L or five thousandths of an inch large. If a bore is .005-.010, or .025 in. small, it will fit an axle that is .005, .010, or .025 in. small and would be marked 5-S, 10-S or 25-S. A wheel marked O. K. will fit an axle marked O. K., etc.

In turning new axles it is preferable to turn as close to size as possible, but as a rule there is a variation of from .006 in. small to .006 in. large; the axles are gaged with the outside micrometer and marked similar to the wheels, such as 6-S, 3-S, O. K., 3-L, 6-L, etc.

After removing the wheels for repair work, the axles should be calipered with the outside micrometer and sizes plus and minus, marked on the axles, then the number of axles of each size noted on a memorandum.

This memorandum is given to the boring mill operator, who begins boring the required number of wheels of each size, starting with the smallest bore and expanding the cutters for each succeeding larger size. All that remains for the man who mounts the car wheels to do is to pair the wheels to axle mates—a 4-S wheel to a 4-S axle, etc.

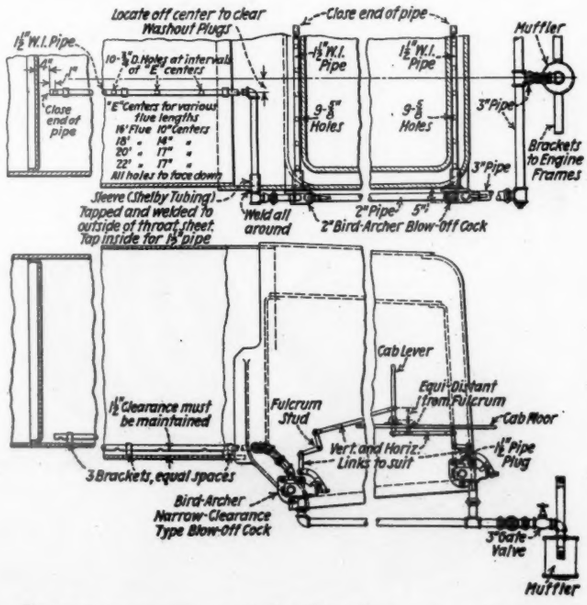


Outside micrometer and reference gage

Improved Boiler Sludge Remover

DURING the past few years, there have been several radical changes in methods of railway operation having to do with locomotive boilers, such as the installation and extended use of pre-steaming plants, the increased attention given to boiler water treatment by chemical means, and extended locomotive runs. Each has helped to make apparent the necessity for efficient blow-off equipment.

For successful pre-steaming, all locomotive boilers entering the terminals affected should have a standard arrangement for a quick and easily handled pre-steaming connection to the steam-pipe system of the terminal. Boilers operating in districts having water treatment require efficient blow-off equipment whether the treatment is external or internal. A more or less severe foaming tendency is usually met with, due to some delayed reaction precipitating solids in the boilers or due to excess alkalinity. Where treatment is internal, all of the solids of the water are deposited within the locomotive boilers and must be ejected. In either event, an efficient sludge-removing equipment makes possible reasonably long mileages between washouts not otherwise possible.



General arrangement of the Bird-Archer type B sludge remover

On extended locomotive runs the limiting feature is frequently the condition of the boiler. Here again an efficient blow-off equipment is a prime requisite. For example, proper attention to boiler blow-off equipment permitted one of the large roads of the west to extend the locomotive mileage between washouts or water changes, on one of its most important districts, from 360 miles to more than 7,000 miles.

To meet these modern operating conditions, the Bird-Archer Company, 122 South Michigan avenue, Chicago, has recently developed an improved sludge removing equipment which not only affords an effective means of removing practically all precipitated solid matter from the locomotive boilers, but furnishes a quick and convenient means of connecting with pre-steaming plants and to the enginehouse blow-down and fill-up lines. In addition, it furnishes internal washout nozzles to facilitate the periodic washing of boilers.

Reference to the drawing shows that there are three separate boiler openings, controlled by one cab lever, with internal pipes reaching throughout the length of the bottom of the barrel of the boiler and of the front and back waterlegs of the firebox. Equally spaced holes, ⅝ in. or ¾ in. in diameter and facing downward, are provided in the internal piping, as indicated in the drawing.

The single operating lever, located within convenient reach on the fireman's side of the cab, is connected through suitable levers and fulcrums to the two blow-off valves. Movement of the cab lever to open position makes three simultaneous openings to the boiler in such a way as to remove the sludge deposits most effectively.

Operated on the road, this equipment blows through a muffler, but when used in the terminals as a pre-steaming connection, or in the enginehouse as a connection to modern boiler-washing plants, the muffler is shut off and one connection only is made on the most convenient side of the locomotive, thus making use of all three boiler openings.

For years the ordinary blow-off cock of about 1½-in. diameter full opening has been used for locomotives of all sizes, from the smallest to the largest. Obviously, unless this blow-off cock is too large for the small locomotives, it is too small for the large ones built within the last fifteen years.

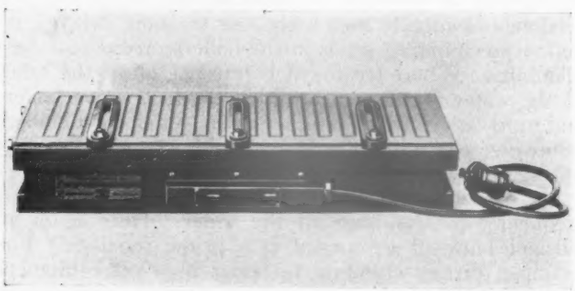
The Bird Archer sludge remover is designed to correct this inconsistency by providing three 1½-in. openings, giving approximately five times the area for rapid filling and emptying of the boiler. The apparatus is inexpensive to install and in bad water districts its cost is said to be balanced by the savings effected in one month.

An additional feature of this new sludge-removing device is the fact that it provides blow-off cocks with only five inches, or less, horizontal extension from the firebox side sheet, depending upon the joint ring thickness and depth of the seat in the welded sleeve. Since practically all of the new locomotives recently designed are built out to the side clearance limits, this is an important advantage. The blow-off cock used with this equipment is the Bird-Archer narrow clearance type, illustrated and described on page 458 of the July *Railway Mechanical Engineer*, which is notable for its quick-action self-closing features as well as the fact that it may be ground in under pressure.

Demagnetizing Switch Used on Magnetic Chuck

THE Taft-Peirce Manufacturing Company Woonsocket, R. I., after a series of laboratory and shop tests has placed on the market a magnetic chuck which it is claimed has much greater holding power and greatly increased magnetic surface, together with a heavier magnetic flux density, which permits a versatility of set-up heretofore impossible.

Laboratory and shop tests indicated that one of the chief causes of failure was breakdown caused by a surge of extremely high voltage, induced momentarily as the electrical circuit is broken and reversed for demagnetization. Since this surge is estimated to be nearly three times as great as the normal high-voltage test to which all Taft-Peirce chucks are subjected for continuous operation, a special demagnetizing switch of the field discharge type has been developed to control the voltage throughout the operation range of the magnetic chuck.

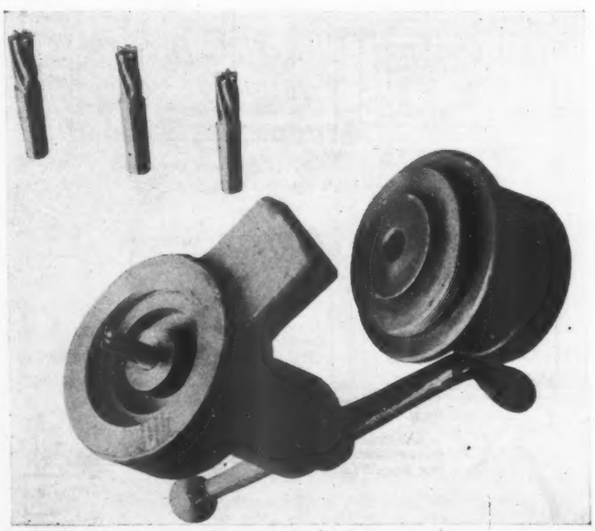


Taft-Peirce magnetic chuck equipped with a special control switch

An ideal switch should absorb and dissipate the excessive voltage surge at the moment of discharge, without permitting it to pass through the chuck coils. The new Taft-Peirce switch is designed to accomplish this end without mechanical or electrical complication and without any change in the methods to which machine operators have become accustomed. A separate contact, arranged within the switch itself and automatic in operation, carries all excessive voltage induced at the break of the circuit to heavy-duty resistors outside the chuck coil circuit where it is absorbed. No additional relays or moving parts are required.

Tool for Oversizing Valve Stem Holes

THE accompanying illustration shows a new tool manufactured by the Foster Johnson Reamer Company, Elkhart, Ind., for boring and over-sizing worn valve stem holes in air compressor governors. The governor cylinder is screwed into the tool which will square it up with the face and center it with the threads. The proper oversize cutter is then worked through the hole leaving a smooth and accurate hole



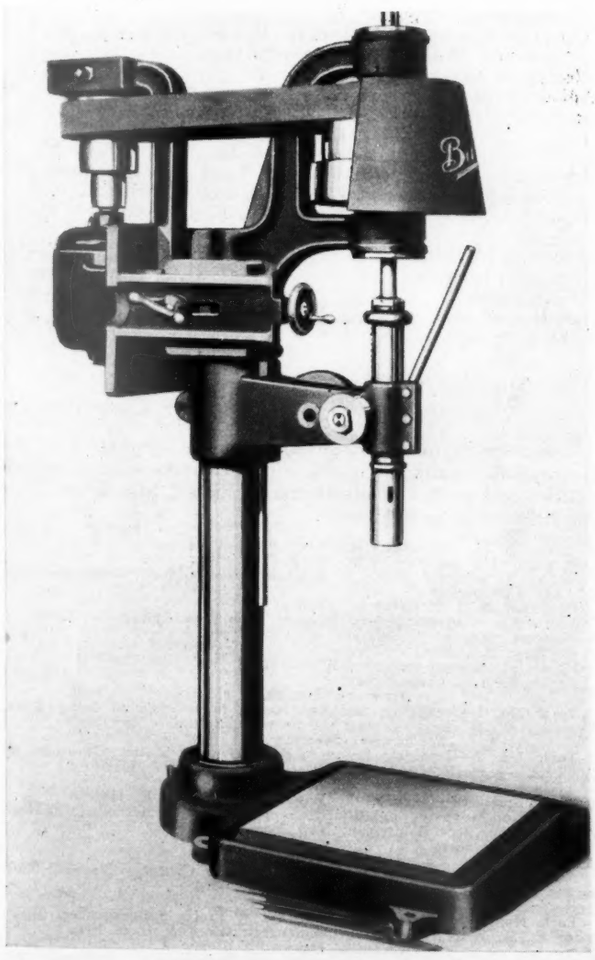
Set of tools for boring and oversizing worn valve stem holes in pump governors

that is in correct alinement. The spindle is of large diameter and long bearing. Four cutters of proper size are furnished with each tool, which will properly bore a hole to fit standard oversize stems. The whole tool is held in a bench vise while in use.

It is made in three sizes, No. 406 for 1-in. governors, No. 407 for 1¼-in. and No. 408 for 1½-in. governors. The company also manufactures reamers for reaming the pump governor cylinder bodies and also tools for reaming the valve seat in the bodies of steam pump governors. The complete set of these tools will give perfect alinement throughout the entire pump governor assembly.

Buffalo 16-in. Sensitive Drill

THE new 16-in. sensitive drilling machines recently placed on the market by the Buffalo Forge Company, Buffalo, N. Y., will drill ⅝-in. to ⅞-in. holes in cast iron. They are equipped with SKF ball bearings. The head brackets are made of cast iron and the column of steel. The outer part of the spindle is guided by a sleeve running in bronze bearings.



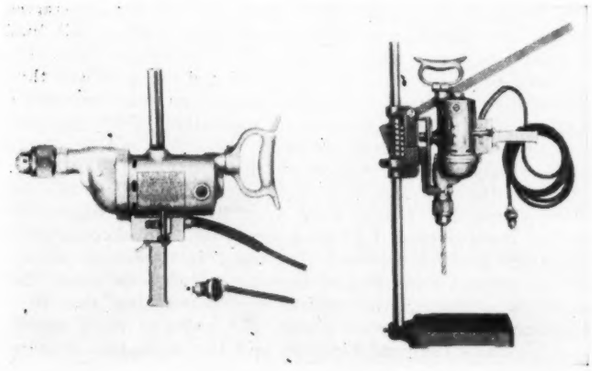
Buffalo bench type sensitive drilling machine 40-in. high

The drilling machines are made in a bench type, having a hand-lever feed, and a floor type, having a hand lever and treadle. A knurled nut directly back of the feed pinion enables the treadle to be idled. The floor-type machine can be furnished without the treadle attachment if desired. The belt slack can be taken up by loosening the hand-operated nut on the shifter bracket, which permits the adjustment of the belt with a handwheel at the left side of the machine.

Wodack All-Purpose 5/8-in. Drill

THE all-purpose portable electric drill, made by the Wodack Electric Tool Corporation, 4627 West Huron street, Chicago, possesses features not usual in portable drill design. It combines lightness with power and performs in an unlimited range of drilling requirements.

A General Electric motor of ample reserve power is built in for direct or alternating current of 60 cycles or less, 110-125 or 220-250 volts as desired. An oversized double-pole trigger switch in a convenient position insures long life. Ball and roller bearings are used, the heavy thrust loads being carried by Timken roller



Two views of the Wodack all-purpose ⅝-in. electric drill

bearings. The hardened gears are simply assembled; the grease compartments are designed for long periods of operation, and correct ventilation is provided for by an oversized fan for quick cooling during idle running.

This tool will drill a ⅝-in. hole in steel and a 2-in. hole in wood.

LOCOMOTIVE SUPERHEATER.—"A Short Story of the Locomotive Superheater," issued by the Superheater Company, 17 East Forty-Second street, New York, contains a brief history of the development of the application of superheated steam to locomotives from the earliest experiments to present-day practice, with special reference to the history of the Elesco superheater on American railroads. This is followed by a statement of how the superheater improves locomotive operation, brief descriptions of Elesco Type A and Type E superheaters, with illustrations of the principal parts and a statement regarding the general cars of a locomotive superheater.

SWING FRAME MACHINES.—Sixteen-inch and 24-inch swing frame machines for high speed snagging are illustrated and described in the four-page bulletins issued by the Norton Company, Worcester, Mass.

News of the Month

THE DELAWARE, LACKAWANNA & WESTERN has ordered from the Pullman Car & Manufacturing Corporation 141 all-steel electric vestibuled motor cars, equipped with roller bearings. The 230-hp. motors and the necessary control equipment for each of these cars will be furnished by the General Electric Company. A contract for the conversion of 141 cars of the latest model of the present suburban coaches to vestibuled trailer cars has been given to the American Car & Foundry Company. This equipment is for use on commuter trains operating between Hoboken, N. J., Montclair, Gladstone and Dover, comprising 70 miles of route, the electrification of which is now under way. Each motor car will be 71 ft. long and weigh 148,000 lb. complete with electrical equipment, and each trailer will weigh 113,000 lb. Each motor car will seat 84 passengers and the trailers 78 or 82 passengers.

MIKADO TYPE locomotive No. 4113, of the St. Louis San Francisco on August 13 completed a 25-day endurance and fuel test and thereby established a record run of 7,350 miles with only the necessary stops for water, fuel and switching and with a continuous fire. The locomotive was fired in the Kansas City (Mo.) yards on July 19 and started for its goal which was three round trips with a full load of freight between Kansas City and Birmingham, Ala. On August 3 the third trip was completed and the goal was then advanced to five trips. The endurance run was terminated because of a federal government regulation which provides that all locomotives must undergo inspection and be placed in the shops at least once every thirty days.

During the run the locomotive, weighing 560,000 lb., was under steam 587 hours, used 1,500,000 gal. of water, 975 tons of coal; averaged 55 cars per train, and accomplished 13,780,749 gross ton-miles. It pulled full tonnage always and on several trips excess tonnage. Only one delay was encountered during the entire trip, that being due to a slight accident to a train ahead. The engine itself caused no delays and the road foreman said that it was in as good a condition at the conclusion of the run as at the start. The coal was a mixture of 80 per cent Alabama coal and 20 per cent Kansas. The run averaged 320 miles a day, and its last trip was 3½hr. ahead of time, with 3,746 tons. The fire was built in the boiler at 3 p. m. on July 19 and was extinguished at 3 a. m. on August 13—24½ days later. A record of 3.500 miles was made by a Great Northern locomotive in 1927.

Clubs and Associations

Program for the Annual Convention of the Tool Foremen's Association

The sessions of the annual convention of the American Railway Tool Foremen's Association will be held at the Hotel Sherman, Chicago, September 11-13, inclusive. The program for this convention is as follows:

Wednesday, September 11, 1929

FIRST SESSION—9:30 A. M.

Opening address: M. D. Chase, shop superintendent, Missouri-Kansas-Texas.
Response: H. L. Taylor, supervisor shop machine tools, Baltimore & Ohio.
President's address: W. R. Millican, Missouri-Kansas-Texas.
Report of secretary-treasurer: G. G. Machina, Chicago, Milwaukee, St. Paul & Pacific.
Appointment of committees.
Adjournment.

SECOND SESSION—2:00 P. M.

Address: E. B. Hall, general superintendent of motive power and machinery, Chicago & North Western.
Response: E. J. McKernan, supervisor of tools, Atchison, Topeka & Santa Fe.
Report of Standing Committee on Standardization of Boiler Tools, A. A. Ferguson, chairman.
Adjournment.

Thursday, September 12, 1929

THIRD SESSION—9:30 A. M.

Address: C. M. House, superintendent of motive power and equipment, Chicago & Alton.
Response: C. A. Shaffer, general supervisor of machinery and tools, Illinois Central.
Report of Standing Committee on Methods and Tools for Repairs to Air Brake Equipment and Reclamation of Various Material, C. C. Kuyper, chairman.
Address: "Importance of Properly-Designed Milling Cutters and Machine Tool Equipment", A. N. Goddard, Goddard & Goddard Company, Inc.
Report of Standing Committee on Jigs and Devices for the Locomotive Shop, L. R. Denst, chairman.
Election of officers.
Adjournment.
Special visit to exhibits.

Friday, September 13, 1929

FOURTH SESSION—9:30 A. M.

Report of Standing Committee on Tools and Equipment for Car Repair Shop and Yard, E. S. Behen, chairman.
Report of Standarization Committee, E. J. McKernan, chairman.
Reports of committees.
Unfinished business.
New business.
Selection of place for annual convention.
Convention adjournment.

Program for the General Foremen's Convention

The program for the twenty-third annual convention of the International Railway General Foremen's Association, which will be held at the Hotel Sherman, Chicago, September 17 to 20, inclusive, is as follows:

Tuesday, September 17, 9:30 a. m.

Invocation by the Rev. Wm. H. Boddy
Address of welcome, Erwin R. Brigham, vice-president, North American Car Corporation
Response, A. J. Armstrong, president
Address, A. R. Ayres, general manager, New York, Chicago St. Louis.
Response, Austin T. Streeper
President Armstrong's address
Report of secretary-treasurer, William Hall
Appointment of Committees

Afternoon Session, 2 p. m.

Topic No. 1—Inspection and Lubrication in Relation to Long Runs, Chairman A. H. Keys, general car foreman, Baltimore & Ohio.

Wednesday, September 18, 9 a. m.

Topic No. 2—Repairing Locomotives other than Steam, Chairman M. A. Slacks, general foreman, New York, New Haven & Hartford.

Afternoon Session, 2 p. m.

Motion pictures—Oxygen, the Wonder Worker, G. E. Harcke.
Topic No. 3—Saving by Modern Shop Production Methods. Chairman A. E. Iveson, general foreman, New York Central.
Election of officers

Thursday, September 19, 9 a. m.

Addrerss, L. C. Thomson, manager of stores, Canadian National Railways.
Response, H. B. Sunderman
Topic No. 4—Reducing Material Delays by Proper Programming, Chairman, F. M. A'Hearn, general foreman, Bessemer & Lake Erie.

Afternoon Session, 2 p. m.

Topic No. 5—Draft Gear Inspection and Maintenance. Chairman, W. J. McCloskey, general car foreman, Illinois Central.
Reports of committees.

Friday, September 20, 9 a. m.
Address, Isiah Hale, safety superintendent system, Atchison, Topeka & Santa Fe
Response, C. M. Hillman
Topic No. 6—The General Foreman's Contribution to Safety First.
Chairman, C. M. Hillman, shop superintendent, Minneapolis & St. Louis.
Unfinished business
New business
Adjournment

The following list gives name of secretaries, dates of next or regular meetings and places of meeting of mechanical associations and railroad clubs

AIR-BRAKE ASSOCIATION.—T. L. Burton, Room 5605 Grand Central Terminal building, New York.

AMERICAN RAILWAY ASSOCIATION DIVISION V.—MECHANICAL.—V. R. Hawthorne, 431 South Dearborn St., Chicago.

DIVISION V—EQUIPMENT PAINTING SECTION.—V. R. Hawthorne, Chicago. Next meeting, Muehlebach Hotel, Kansas City, Mo., September 10-12.

DIVISION VI—PURCHASES AND STORES.—W. J. Farrell, 30 Vesey St., New York.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—G. G. Macina, 11402 Calumet avenue, Chicago. Next meeting, September 11-14, 1929, Hotel Sherman, Chicago.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. Thirty-ninth St., New York. Railroad Division, Marion B. Richardson, associate editor, *Railway Mechanical Engineer*, 30 Church St., New York.

AMERICAN SOCIETY FOR STEEL TREATING.—W. H. Eiseman, 7016 Euclid Ave., Cleveland, Ohio. Annual Convention, September 9-13, Cleveland, O.

AMERICAN SOCIETY FOR TESTING MATERIALS.—C. L. Warwick, 1315 Spruce St., Philadelphia, Pa.

AMERICAN WELDING SOCIETY.—Miss M. M. Kelley, 29 West Thirty-ninth street, New York.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Joseph A. Andrucetti, C. & N. W., Room 411, C. & N. W. Station, Chicago, Ill. Annual meeting Hotel Sherman, Chicago, Oct 22-25.

CANADIAN RAILWAY CLUB.—C. R. Crook, 129 Charon St., Montreal, Que. Regular meetings, second Tuesday in each month, except June, July and August, at Windsor Hotel, Montreal, Que.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—G. K. Oliver, 7836 So. Morgan street, Chicago, Ill. Regular meeting second Monday in each month, except June, July and August, Great Northern Hotel, Chicago, Ill.

CAR FOREMEN'S ASSOCIATION OF ST. LOUIS.—F. G. Wiegman, 720 North Twenty-third street, East St. Louis, Mo. Regular meeting first Tuesday in each month, except June, July and August, at Broadview Hotel, East St. Louis, Ill.

CAR FOREMEN'S CLUB OF LOS ANGELES.—J. W. Krause, 514 East Eighth St., Los Angeles, Cal. Meetings second Friday of each month in the Pacific Electric Club building, Los Angeles, Cal.

CENTRAL RAILWAY CLUB.—Regular meetings second Tuesday each month, except June, July and August, at Hotel Statler, Buffalo.

CHIEF INTERCHANGE CAR INSPECTORS AND CAR FOREMEN'S ASSOCIATION.—See Master Car Builders' and Supervisors' Ass'n.

CINCINNATI RAILWAY CLUB.—D. R. Boyd, 3328 Beekman St., Cincinnati. Regular meeting second Tuesday, February, May, September and November. Next meeting September 10, at the Chamber of Commerce Building. The speaker of the evening will be F. H. Boyd, special agent to the general manager of the Erie.

CLEVELAND RAILWAY CLUB.—F. L. Frericks, 14416 Adler Ave., Cleveland, Ohio. Meeting first Monday each month, except July, August and September at Hotel Hollenden, East Sixth and Superior Ave.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—W. J. Mayer, Michigan Central, 2347 Clark Ave., Detroit, Mich. Next meeting, August 20-22, 1929, Fort Shelby Hotel, Detroit.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—L. G. Plant, Railway Exchange, 80 E. Jackson Boulevard, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—William Hall, 1061 W. Wabash street, Winona. Minn. Convention September 17-20, inclusive, Hotel Sherman, Chicago.

LOUISIANA CAR DEPARTMENT ASSOCIATION.—L. Brownlee, 3212 Delachaise street, New Orleans, La. Meetings third Thursday in each month.

MASTER BOILERMAKERS' ASSOCIATION.—A. F. Stiglmeier, acting secretary, care of New York Central, 138 North Allen street, Albany, N. Y.

MASTER CAR BUILDERS' AND SUPERVISORS' ASSOCIATION.—A. S. Sternberg, master car builder, Belt Railway of Chicago, Chicago. Annual convention September 4, 5 and 6 at the Hotel Sherman, Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meeting second Tuesday in each month, excepting June, July, August and September, Copley-Plaza Hotel, Boston.

NEW YORK RAILROAD CLUB—Meetings third Friday in each month, except June, July and August, at 29 West Thirty-ninth St., New York. Mrs. M. E. Hartman, acting secretary, 26 Cortlandt street, New York. Next meeting September 20, 8 p. m.

PACIFIC RAILWAY CLUB.—W. S. Wollner, P. O. Box 3275, San Francisco, Cal. Regular meetings, second Tuesday of each month in San Francisco and Oakland, Cal., alternately. Next meeting September 5, Transportation Club, Palace Hotel. Dr. D. B. Mackie, of the California State Dept. of Agriculture and Fred Reede, Standardization Dept., Cal. Fruit Exchange, will speak on "Shall the Mediterranean Fruit Fly Come to California?"

RAILWAY CAR DEPARTMENT OFFICERS' ASSOCIATION.—See Master Car Builders' and Supervisors' Association.

RAILWAY CLUB OF GREENVILLE.—Paul A. Minnis, Bessemer & Lake Erie, Greenville, Pa. Meetings third Thursday of each month, except June, July and August.

RAILWAY CLUB OF PITTSBURGH.—J. D. Conway, 515 Grandview Ave., Pittsburgh, Pa. Regular meeting fourth Thursday in month, except June, July and August. Fort Pitt Hotel, Pittsburgh, Pa.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, M. P. O. Drawer 24, St. Louis, Mo. Regular meetings, second Friday in each month, except June, July and August.

SOUTHERN AND SOUTHWESTERN RAILWAY CLUB.—A. T. Miller, P. O. Box 1205 Atlanta, Ga. Regular meetings third Thursday in January, March, May, July, September and November. Annual meeting third Thursday in November, Ansley Hotel, Atlanta, Ga.

SOUTHWEST MASTER CAR BUILDERS' AND SUPERVISORS' ASSOCIATION.—See Master Car Builders' & Supervisors' Association.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, 1177 East Ninety-eighth St., Cleveland, Ohio. Annual meeting September 24-28, Hotel Sherman, Chicago.

WESTERN RAILWAY CLUB.—W. J. Dickinson, 189 West Madison St., Chicago. Regular meetings, third Monday in each month, except June, July and August.

Supply Trade Notes

THE NATIONAL BEARING METALS CORPORATION has moved its office from 30 Church street to 230 Park avenue, New York City.

JOHN D. HURLEY, president of the Independent Pneumatic Tool Company died at Chicago on August 15 following a sudden heart attack.

THE ORTON CRANE AND SHOVEL COMPANY, Chicago, has appointed Thomas D. Crowley and Company, Chicago, its special railway sales representative in the United States.

ROBERT M. WAPLES has been elected secretary and manager of the service department of the Garlock Packing Company, with headquarters at Palmyra, N. Y.

E. J. SCHWANHAUSSER, for the past two years assistant manager of the Harrison works of the Worthington Pump & Machinery Corporation, has been appointed manager of the Buffalo works.

CARTER BLATCHFORD, Railway Exchange building, Chicago, has been appointed Chicago representative of the Martin circulator, a device manufactured by the Locomotive Boiler Economizer Company, Los Angeles, Cal.

W. M. WILSON, Chicago agent of the Flannery Bolt Company, Pittsburgh, Pa., has moved his office from the Railway Exchange to Willoughby Tower, 8 South Michigan avenue, Chicago.

C. S. MURRAY, manager of the St. Louis, Mo., office of the Dearborn Chemical Company, Chicago, died on July 12 from heart trouble. He was born in Ireland on March 24, 1864, and had been manager of the St. Louis office for the past 18 years.

HAROLD SMITH, general solicitor of the Westinghouse Electric & Manufacturing Company has been elected vice-president. Mr. Smith's office will be in the Westinghouse building, 150 Broadway, New York City.

HORACE STEADMAN CLARK, Pacific manager of the Westinghouse Air Brake Company, San Francisco, Cal., also a director and vice-president of the Westinghouse Pacific Coast Brake Company, Emeryville, Cal., died on August 16 at Berkeley, Cal., at the age of 57.

THE RUDEL-RYDER MACHINERY COMPANY, LTD., 159 Bay street, Toronto, Ont., has been appointed agent of the Geometric Tool Company, New Haven, Conn., for the sale of Geometric self-opening dies, collapsing taps and threading machines in the Province of Ontario, succeeding the F. F. Barber Machinery Company.

J. E. BUCKINGHAM has been appointed acting manager of the railroad department of the Worthington Pump & Machinery Corporation, with headquarters at Harrison, N. J., D. R. Coleman having been granted a six months' leave of absence. D. S. Ellis, recently in the employ of the New York Central, has joined the railroad department of the Worthington Corporation and has been appointed eastern district sales manager, and J. M. Lammedee has been appointed western district sales manager.

CHARLES E. EVELETH, vice-president of the General Electric Company, in the manufacturing department, has been trans-

ferred to the engineering department as vice-president and will be associated with E. W. Allen in the direction of that department's affairs. Mr. Eveleth will give special attention to the problems of the designing departments and works laboratories.

W. J. Beck for 19 years director of research of the American Rolling Mill Company, Middletown, Ohio, has been appointed assistant to Charles R. Hook, general manager and Dr. Anson Hayes has been appointed director of research in charge of all metallurgical research problems for the organization. Mr. Beck will have direct charge of the development in electrical steel sheets for magnetic purposes.

The Direct Steaming Company of Canada Ltd., has been incorporated at Kingston, Ont., and, by agreement with the Railway Engineering Equipment Company of Chicago, will control the construction of all future installations of direct steaming systems in Canada. William Casey is president of the new company; S. C. Holland and G. P. Bogert, vice-presidents; J. M. Hickey, secretary, and G. W. Daly, treasurer.

Phil Arnold, district sales manager of the Garlock Packing Company, Palmyra, N. Y., has been appointed vice-president in charge of sales, with headquarters at 2111 Terminal Tower, Cleveland, Ohio; Cecil R. Hubbard has been appointed vice-president in charge of production, with headquarters at Palmyra; Robert M. Waples has been appointed secretary and manager of the service department, with headquarters at Palmyra; and Robert M. Perkins has been appointed district sales manager of the Cleveland district, with headquarters at 1276 Superior avenue, Cleveland, to succeed Mr. Arnold. Mr. Arnold was born at Jeffersonville, Ind., on May 19, 1883. He graduated from the Joplin (Mo.) high school in 1902 and entered business life with the Day Rubber Company, St. Louis, Mo., where he served for a year as a salesman in Oklahoma and Indian territory. In 1904 he became connected with the Denver Rubber Company in the Northwest, then being appointed manager of the retail department in 1906. Mr. Arnold entered the service of the Garlock Packing Company in 1908 as sales representative in Iowa and Nebraska. The following year he was transferred to the Chicago railroad territory and in 1912 he was appointed manager of the railroad department. In 1913 he was appointed district manager of sales at Cleveland.

Phil Arnold

The Continental Brake Shoe & Equipment Company, New York, has opened a Cleveland, Ohio, office in the Terminal Tower, in charge of Paul Zens who has been elected a director and vice-president of the company. Mr. Zens was one of the original four members of the Jordan Motor Car Company, having gone to Cleveland with Edward S. Jordan from the old Thomas B. Jeffery Company of Kenosha, Wis. He continued in an executive capacity with the Jordan Company, in charge of purchases and later in charge of sales, leaving the company a few months ago after serving for twelve years.

J. N. Ebling, for the past 14 years treasurer of the Railway Specialties Corporation, 50 Church street, New York, has been elected president; J. A. Carmody, for several years past superintendent of electric equipment on the New York Central, has been elected a vice-president of the corporation; H. M. Fetterolf, who has been associated with the corporation in its sales department for the past nine years, has been elected a vice-president, and Fred Roth, formerly with the sales department of the Ohio Brass Company, has been appointed sales representative.

The Sale of the Commonwealth Steel Company, Granite, Ill., to the General Steel Castings Corporation, which is building a plant at Edyystone, Pa., was formally closed on July 31, and the General Steel Castings Corporation acquired all the assets of the Commonwealth Steel Company. The officers of the General Steel Castings Corporation are: R. H. Ripley, president; H. M. Pflager, vice-president; A. S. Blagden, vice-president and general manager of the Eddystone division; Harris Hoblitzelle, vice-president and general manager of the Commonwealth division; G. H. Alston, secretary and treasurer. C. H. Howard will act as chairman of the board.

Howard Stanley Folker, for over ten years chief engineer of the National Safety Appliance Company, San Francisco, Cal. died on August 11. Mr. Folker had been in the service of the National Safety Appliance Company for 18 years. He was the inventor of the company's system of automatic train control and had taken out more than 100 patents in train control and other devices. He also carried out a great deal of original research work in the matter of handling and controlling permanent magnets of more than ordinary size.

The general offices of the Standard Auto-Tite Joints Company, Pittsburgh, Pa., have been moved from the Park building to a newly opened plant at 916 Forbes street. Norman Allderdice, president, retains offices in the Park building, while A. M. Frauenheim, vice-president and general manager, is located at the Forbes street plant. E. H. Mattingley, 804 Railway Exchange building, Chicago, has been appointed representative in the Chicago district, and H. W. Barhyte, formerly with the Southern Wheel Company has been appointed to a similar position in the New York district.

Henry Gardner, for many years in railroad service, has been appointed vice-president in charge of sales of the Coppus Locomotive Equipment Company, Worcester, Mass. He was born in Salem, Mass., and graduated from the Massachusetts Institute of Technology in 1896. In the same year he began railroad work as special apprentice in the Boston & Maine shops at Boston, Mass. Later he was appointed shop draftsman and inspector at Concord, N. H., becoming assistant master mechanic at Concord in 1904. Subsequently he became locomotive designer for the H. K. Porter Company, Pittsburgh, Pa., and chief draftsman of the Pittsburgh & Lake Erie. From 1908 to 1914 he was supervisor of shop systems and supervisor of apprentices on the New York Central lines. In 1914 Mr. Gardner left New York to become assistant superintendent of shops on the Baltimore & Ohio at Baltimore, Md. Since 1916 he held respectively on the Baltimore & Ohio the positions of supervisor of material conservation, corporate mechanical engineer, and special engineer on the staff of the chief of motive power and equipment.

In Order to Promote and extend the use of Diesel power in America twelve of the leading builders of Diesel engines in the United States have organized the Diesel engine Manufacturers' Association, with headquarters at 30 Church street, New York. The association is comprised of the New London Ship & Engine Works; Electric Boat Company; Worthington Pump & Machinery Corporation; Fulton Iron Works Company; Ingersoll-Rand Company; Fairbanks, Morse & Co.; Nordberg Manufacturing Company; I. P. Morris & DeLaVergne, Inc.; Winton Engine Company; Cooper-Bessemer Corporation; McIntosh & Seymour Corporation, Busch-Sulzer Bros. Diesel Engine Company, and Hooven, Owens, Rentschler Company. Henry R. Supthen, president of the Electric Boat Company, is president of the association; E. T. Fishwick, vice-president of the Worthington Pump & Machinery Corporation, is vice-president, and Harlan A. Pratt, manager oil and gas engine department of the Ingersoll-Rand Company, is secretary and treasurer. M. J. Reed, located at 30 Church street, is research engineer.

Trade Publications

Copies of trade publications described in this column can be obtained by writing to the manufacturers. State the name and number of the bulletin or catalog desired, when mentioned in the description.

VISES.—Various types of vises made in semi-steel castings are described and illustrated in the 44-page catalogue, No. 38, issued by the Athol Machine & Foundry Company, Athol, Mass.

ARC WELDING.—The wide application of electric arc welding in the maintenance field is pictorially shown in publication D. M. F. 5156 released by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

WELDING INSTRUCTIONS.—Revised working instructions for welding, brazing and soldering monel metal and pure nickel are contained in the eight-page bulletin being distributed by the International Nickel Company, New York.

STAYBOLT CATALOGUE.—The 1929 staybolt catalogue issued by the Flannery Bolt Company, Flannery building, Pittsburgh, Pa., contains four illustrated sections on welded assemblage, staybolts, Tate threaded assemblage and tell-tale bolts and tester.

LATHES.—The new model South Bend back geared screw cutting lathe, built for the working of metals in the toolroom, machine shop, etc., is described in the 96-page illustrated catalogue, No. 90-A, issued by the South Bend Lathe Works, 425 East Madison street, South Bend, Ind.

WELDED CHAIN.—"Welded Chain—Its Use and Abuse" is the title of a pamphlet issued by the American Chain Company, Inc., Bridgeport, Conn. It contains tables of sizes, weights, number of links per foot and other useful information and suggestions on the use of welded chain.

PIG IRON.—Two articles on the effect on castings of nickel-chromium, by Dr. Richard Moldenke, are contained in the revised edition of the Mayari pig iron book issued by the Bethlehem Steel Company, Bethlehem, Pa. Silvery Mayari, a new general-purpose pig iron for making super-strength castings, is briefly described in booklet No. 54.

X-RAYS IN INDUSTRY.—A brief survey of the theory and use of x-rays in industry is included in a booklet just prepared by the Eastman Kodak Company, Rochester, N. Y. The publication has the intention of suggesting some of the industrial applications of x-rays in inspecting the internal construction of opaque materials.

FEEDWATER HEATER INSTRUCTION BOOK.—The fifth edition of the feedwater heater instruction book prepared by the Superheater Company, 17 East Forty-Second street, New York, gives full instructions on the operation and maintenance of Elesco feedwater heaters. It is a complete revision of the fourth edition issued in 1926.

FOUNDRY MOLDING MACHINES.—Illustrated bulletins Nos. 291, 292, 293 and 294, descriptive of flask lift machines, power squeezers and jar squeezers, plain and shockless jarring machines, and Rollover pattern drawing machines, respectively, are being issued in booklet form by the Tabor Manufacturing Company, 6225 Tacony street, Philadelphia, Pa.

PHOTO-ELASTIC APPARATUS.—Professor Coker's photo-elastic apparatus for determining the distribution of stress in structural and machine members is described in the the 28-page illustrated catalogue issued by Adam Hilger, Ltd., 24 Rochester place, London, N. W. I., England. The apparatus is designed specifically for the use of engineers and can be used for determining the stresses set up in moving parts of machines, such as gear wheels, cams, cutting tools, etc.

TIGER CRANE.—Herringbone gears feature the new Tiger crane described in Bulletin No. 188 issued by the Whiting Corporation, Harvey, Ill. With this gear the necessary speeds are obtained with two gear reductions, instead of three as ordinarily employed. Hyatt roller bearings are also used in the construction of this crane.

PLANT LUBRICATION.—"Houghton on Industrial Plant Lubrication" is the title of the 86-page illustrated booklet issued by E. F. Houghton & Co., Philadelphia, Pa. The booklet discusses the lubrication theory, objections to the use of mineral lubrication oils and greases, Houghton's absorbed oils and their application, lubrication of bearings, effect of temperature on lubricants, etc.

PIPE, TUBE AND BAR BENDING MACHINES.—The Wallace Supplies Manufacturing Company, 1310 Diversey Parkway, Chicago, is distributing bulletin No. 25 describing and illustrating pipe, tube and bar bending machines up to 6-in. pipe size. Other equipment described includes punches and shears, lathes, saws and various types of metal storage cabinets.

SPRAY PAINTING EQUIPMENT.—Bulletin R of the Binks Manufacturing Company, 3114 Carroll avenue, Chicago, gives a detailed explanation, by photographs and descriptions, of the uses and methods of operating railroad spray painting equipment, separate sections being devoted to the spray painting and finishing of passenger equipment, mechanical equipment, freight equipment, and bridge and building maintenance.

HIGH TEST WELDING ROD.—A 12-page booklet, entitled "High Test Welding Rod," published by the Oxweld Acetylene Company, 205 East Forty-Second street, New York, describes an improved welding rod for making stronger welds in steel. Reasons for specifying, and how to use the high test rod also are discussed in the booklet.

SPRAY-PAINTING EQUIPMENT.—The advanced, complete line of DeVilbiss portable spray painting equipment is described in the 28-page catalogue issued by the DeVilbiss Company, Toledo, Ohio. Illustrations show the type and character of work handled by DeVilbiss spray systems on the exterior, interior and trim of all classes of modern structures. Eight features of the Type AV spray gun are discussed in detail.

MULTIPLE VALVE THROTTLE.—A series of six reasons why multiple valves are used in American multiple throttles are given in Bulletin 4, entitled "Why a Multiple Valve Throttle?", issued by the American Throttle Company, 17 East Forty-Second street, New York. A front end view of a locomotive shows the American multiple throttle, superheater and steam pipes in place. A perspective view points out the location of the various parts of the throttle and superheater header.

CAR HEATING.—The Vapor Car Heating Company, Inc., Railway Exchange, Chicago, has issued a new pamphlet, No. 102, entitled "Increased Efficiency and Economy in Car Heating," covering its latest development of the unit control system which automatically regulates passenger car temperatures without manual attention, both in train service and while cars are in terminal yards. This system is applied to new passenger cars, as well as to cars passing through shops for repairs.

1929 LOCOMOTIVE PROGRESS.—Following the same general lines as the two previous editions, the 1929 Locomotive Progress booklet, issued by the Superheater Company, 17 East Forty-Second street, New York, illustrates several examples of representative modern locomotives, which give a fair cross-section of American motive power of today. For each locomotive shown the general dimensions are given, also brief facts concerning the design, equipment or service.

Personal Mention

General

T. J. CLARK, general master mechanic of the Great Northern, Lines West, with headquarters at Spokane, Wash., has been promoted to superintendent of motive power of those lines, succeeding J. J. Dowling.

EDWARD C. RICHARDS, assistant to the superintendent of rolling stock of the Michigan Central, has been promoted to superintendent of rolling stock, with headquarters as before at Detroit, Mich., succeeding J. T. Downs, deceased.

Shop and Enginehouse

R. D. CATO, assistant machine shop foreman of the Texas & Pacific, with headquarters at Marshall, Tex., has been promoted to the position of machine shop foreman.

ARCHIE WALLACE, machine shop foreman of the Texas & Pacific at Marshall, Tex., has been promoted to the position of general foreman, locomotive department, succeeding J. C. Clyde.

ROBERT H. NICHOLAS, assistant master mechanic of the Central of New Jersey, with headquarters at Jersey City, N. J., has been appointed general locomotive inspector, with the same headquarters, succeeding C. H. Van Why, retired. The position formerly held by Mr. Nicholas has been abolished.

Master Mechanics and Road Foremen

I. G. POOL has been appointed assistant master mechanic of the Montana division of the Great Northern, with headquarters at Havre, Mont.

E. ENGLISH, master mechanic of the Cascade division of the Great Northern at Seattle, Wash., has been promoted to general master mechanic, with headquarters at Great Falls, Mont.

J. J. DOWLING, superintendent of motive power of the Great Northern, Lines West, has been appointed master mechanic of the Cascade division, with headquarters at Seattle, Wash. Mr. Dowling succeeds E. English.

S. S. TALBERT, general foreman at the Mobile (Ala.) shops of the Louisville & Nashville, has been promoted to master mechanic, with headquarters at the same point, succeeding J. D. Maxwell, deceased.

Car Department

W. B. MARTIN, car foreman of the Missouri Pacific at Kingsville, Tex., has been promoted to the position of general car foreman, with headquarters at Palestine, Tex.

J. KESKEYS, assistant general coach foreman of the Gulf Coast & Santa Fe, has been promoted to the position of general coach foreman, with headquarters at Cleburne, Tex.

F. F. FERRY has been appointed car foreman of the O-W. R. R. & N. unit of the Union Pacific System, with jurisdiction over the light repair tracks and train yard at Albina, Ore.

A. F. MOORE, general foreman of the Pennsylvania with headquarters at Columbus, Ohio, has been appointed assistant chief car inspector in the office of the general superintendent of motive power, with headquarters at Chicago, succeeding P. S. Walter, retired.

Obituary

R. D. HAWKINS, general superintendent of motive power of the Atlantic Coast Line, with headquarters at Wilmington, N. C., died on August 7.

HERBERT R. KIMBALL, master mechanic of the Duluth & Northern Minnesota, with headquarters at Knife River, Minn., from 1910 until its operation was discontinued in 1922, died on June 29 at International Falls, Minn.

GEORGE A. SHARP, who served as superintendent and purchasing agent of the Prince Edward Island (now part of the Canadian National), with headquarters at Charlottetown, P. E. I., from 1897 to 1911, died at his home at Vancouver, B. C., on July 16 at the age of 77 years.

JOHN D. MAXWELL, master mechanic of the Mobile shops of the Louisville & Nashville, died of heart trouble at his home at Mobile, Ala., on May 16. Mr. Maxwell had been master mechanic at Mobile for nearly 22 years and had been in the service of the L. & N. for 48 years.

WILLIAM FRANCIS (FRANK) HOWARD, former master car builder of the Wabash, died at his home at Toledo, Ohio, on June 16 following an attack of bronchial pneumonia. Mr. Howard was born on September 30, 1838, at New London, Mo., and obtained his academic education at University of Missouri. He entered railway service in 1869 as a car builder on the Missouri-Kansas-Texas at Sedalia, Mo., leaving that road as general foreman at Denison, Tex., in 1879 to become master car builder of the Denver & Rio Grande (now the Denver & Rio Grande Western). From 1881 to 1884 he was master car builder of the Northern Pacific and during 1885 he served as master car builder of the Texas & Pacific. In the same year he became master car builder of the Wabash, with headquarters at Toledo, where he remained until his retirement from active duty in 1908.

THOMAS A. LAWES, former superintendent of motive power of the Chicago & Eastern Illinois and mechanical engineer of the Cleveland, Cincinnati, Chicago & St. Louis and the New York, Chicago & St. Louis, died at Cleveland, Ohio, on June 4 following an operation. Mr. Lawes had been in railway service for 53 years. He was born at Franklin, La., on September 1, 1852, and began his railway career as an apprentice machinist on the Terre Haute & Indianapolis (now part of the Pennsylvania) in 1866. Later he was advanced on this road through the positions of machinist, draftsman, gang foreman and general foreman. From 1882 to 1891 Mr. Lawes served on the Cleveland, Columbus, Cincinnati & Indianapolis (now part of the Big Four) as draftsman, chief draftsman, general foreman in the locomotive department and master mechanic. He was then appointed engineer of tests of the Erie and also acted as assistant master mechanic and master mechanic. During 1892 and 1893 he was mechanical engineer of the Fisher Electric Company at Detroit, Mich., then returning to railway service as mechanical engineer of the Big Four at Indianapolis, Ind., where he remained until 1896 when he was appointed superintendent of motive power and machinery of the Chicago & Eastern Illinois, with headquarters at Danville, Ill. From December, 1904, until his retirement on October 1, 1922, Mr. Lawes had served as mechanical engineer of the Nickel Plate, with headquarters at Cleveland, except for a short period in 1909, 1910 and 1911, when he was master mechanic of the Chicago, Terre Haute & Southeastern (now part of the Chicago, Milwaukee, St. Paul & Pacific). Since his retirement he had spent a large amount of his time in Florida.